

DDESB-KT (CEHND-PM-CR/9 DEC 91) (415-10f) 1st End Dr. Canada,  
325-0891


SUBJECT: Standard Definitive Design of Barricades, DEF 149-30-01

Department of Defense Explosives Safety Board, 2461 Eisenhower  
Avenue, Alexandria, VA 22331-0600 25 FEB 1992

FOR COMMANDER, HUNTSVILLE DIVISION, CORPS OF ENGINEERS,  
ATTN: CEHND-ED-PM (MR. SAMUEL D. BOLIN), P. O. Box 1600,  
HUNTSVILLE, AL 35807-4301

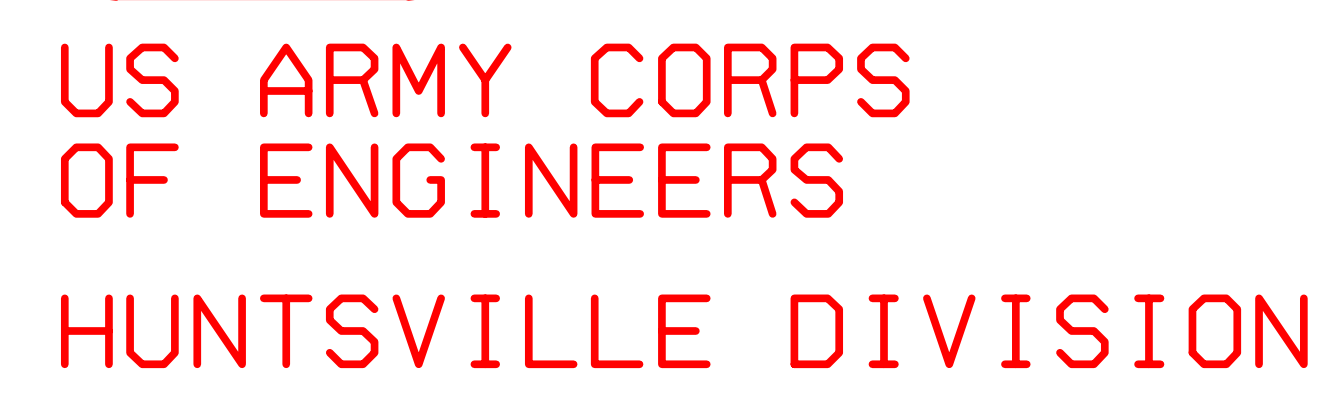
The subject Definitive Drawings (DEF 149-30-01), last revised on 22 November 1991, have been reviewed with respect to explosives safety. The various barricade configurations are recognized as effective for applications shown and, consistent with constraints indicated on the drawings, are approved for site-adaptable implementation.

wd all encls

  
DAVID K. WALLACE  
Captain, USN  
Chairman

CF:  
~~USATGES~~ *me*

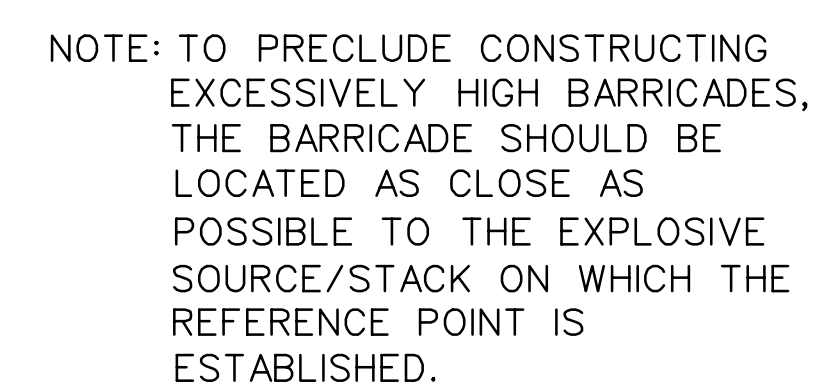




# DEFINITIVE DRAWINGS

# BARRICADES

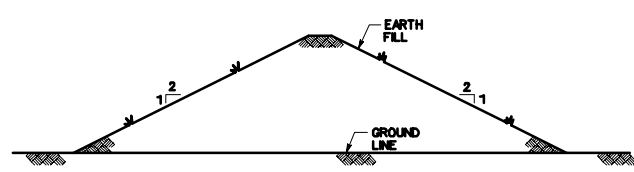
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N.T.S.

barr1.dgn

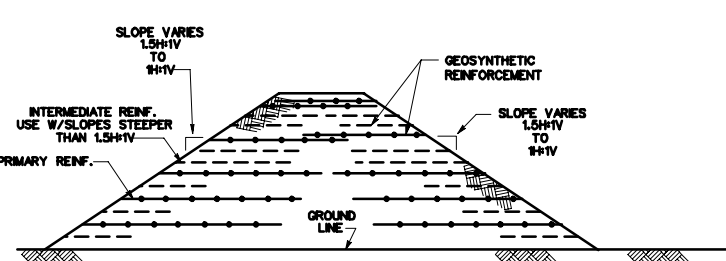




B1 - EARTH MOUND

REMARKS:

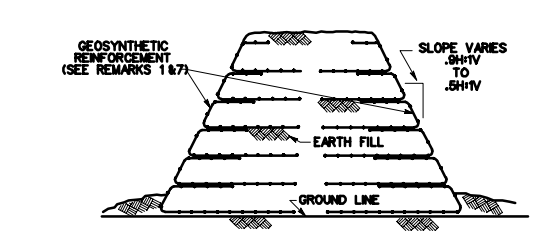
1. CAN BE RAPIDLY CONSTRUCTED WITH UNSKILLED LABOR.
2. NO HEIGHT OR LENGTH LIMITATIONS.
3. UNSUITABLE WHERE SPACE IS LIMITED.
4. REQUIRES SOIL STABILIZATION (SEEDING, ETC.)
5. REQUIRES REPEATED MAINTENANCE.



B2 - REINFORCED EARTH MOUND

REMARKS:

1. REDUCED FILL REQUIREMENT OVER UNREINFORCED EARTH MOUND.
2. EFFICIENT CONSTRUCTION AND USE OF LAND.
3. CAN BE RAPIDLY CONSTRUCTED WITH UNSKILLED LABOR.
4. ALLOWS CONSTRUCTION OF STEEPER SLOPES THAN THE SOIL'S NATURAL ANGLE OF REPOSE.
5. NO HEIGHT OR LENGTH LIMITATIONS.
6. REINFORCEMENT IS LIGHTWEIGHT AND EASILY CUT ON SITE.
7. REQUIRES SOIL STABILIZATION. GRASS COVER, IF USED, IS DIFFICULT TO MAINTAIN.
8. GEOSYNTHETIC REINFORCEMENT IS PLASTIC MESH MADE OF HIGH-DENSITY POLYMERS.  
SOURCE: THE TENSAR CORP.  
P.O. BOX 986  
MORROW, GA 30260  
(404) 968-3255



B3 - WRAP-AROUND REINFORCED EARTH MOUND

REMARKS:

1. A FINE MESH POLYMER NET REQUIRED FOR EROSION CONTROL.
2. REQUIRES LESS FILL THAN B1 OR B2.
3. CAN BE LOCATED CLOSE TO SITE BOUNDARIES OR OBSTRUCTIONS.
4. CAN BE RAPIDLY CONSTRUCTED WITH UNSKILLED LABOR.
5. REINFORCEMENT IS LIGHTWEIGHT AND EASILY CUT ON SITE.
6. TEMPORARY SUPPORTS REQUIRED AT FACES DURING CONSTRUCTION.
7. GEOSYNTHETIC REINFORCEMENT IS PLASTIC MESH MADE OF HIGH-DENSITY POLYMERS.  
SOURCE: THE TENSAR CORP.  
P.O. BOX 986  
MORROW, GA 30260  
(404) 968-3255

CORPS OF ENGINEERS

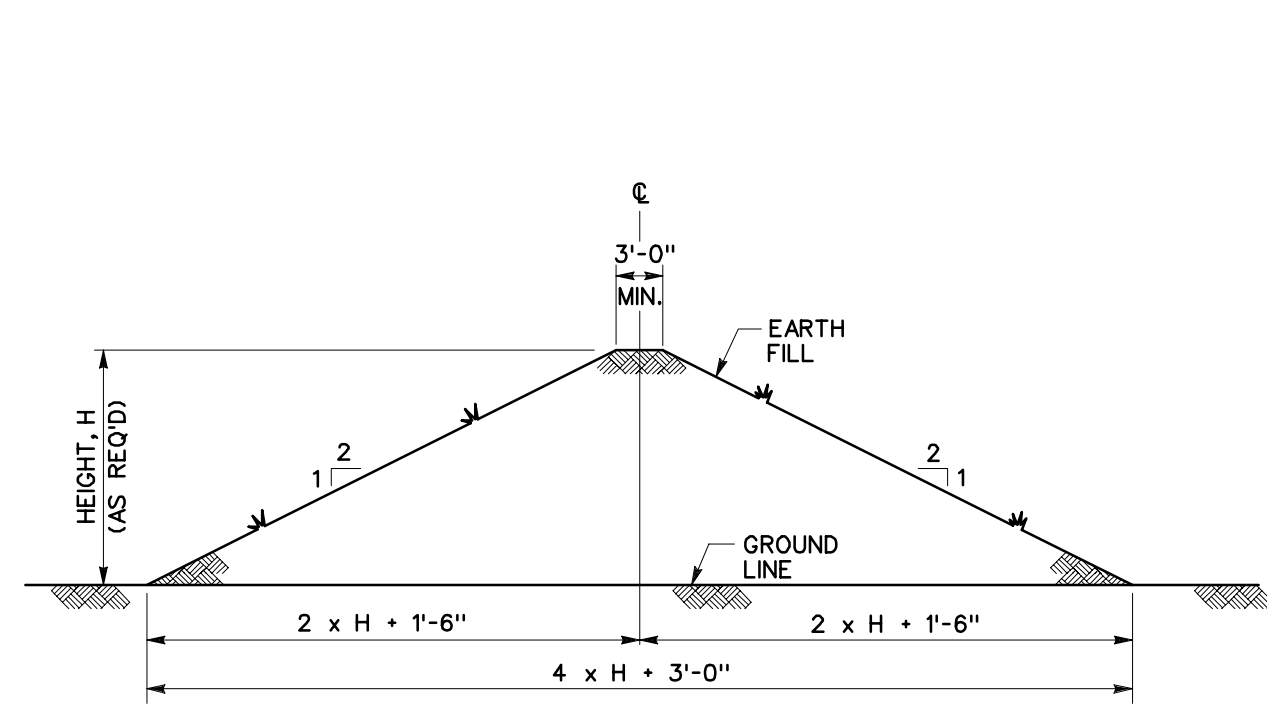
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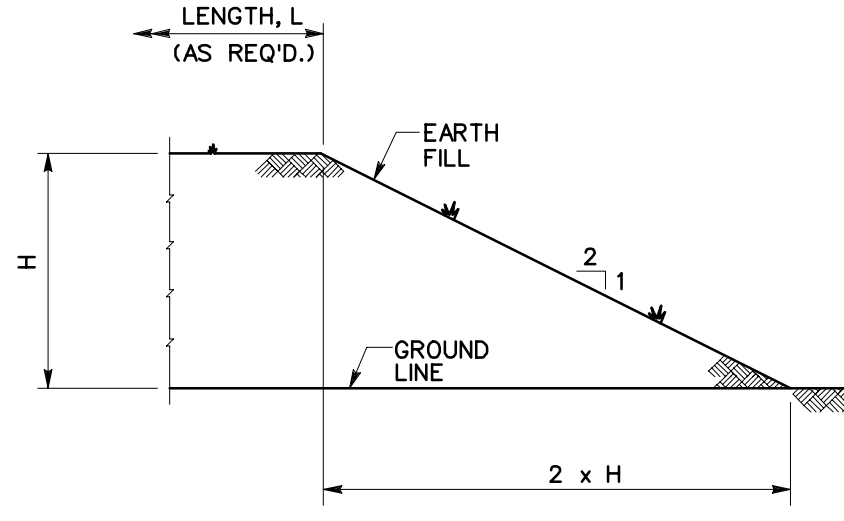
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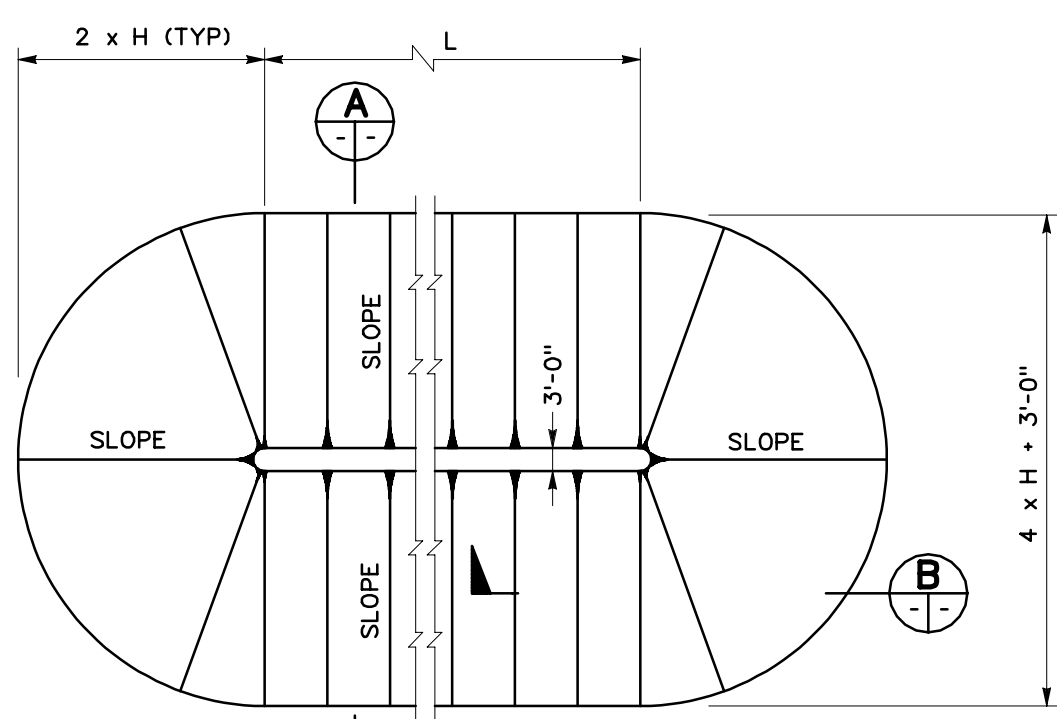
U.S. ARMY



SECTION A-A  
N.T.S.

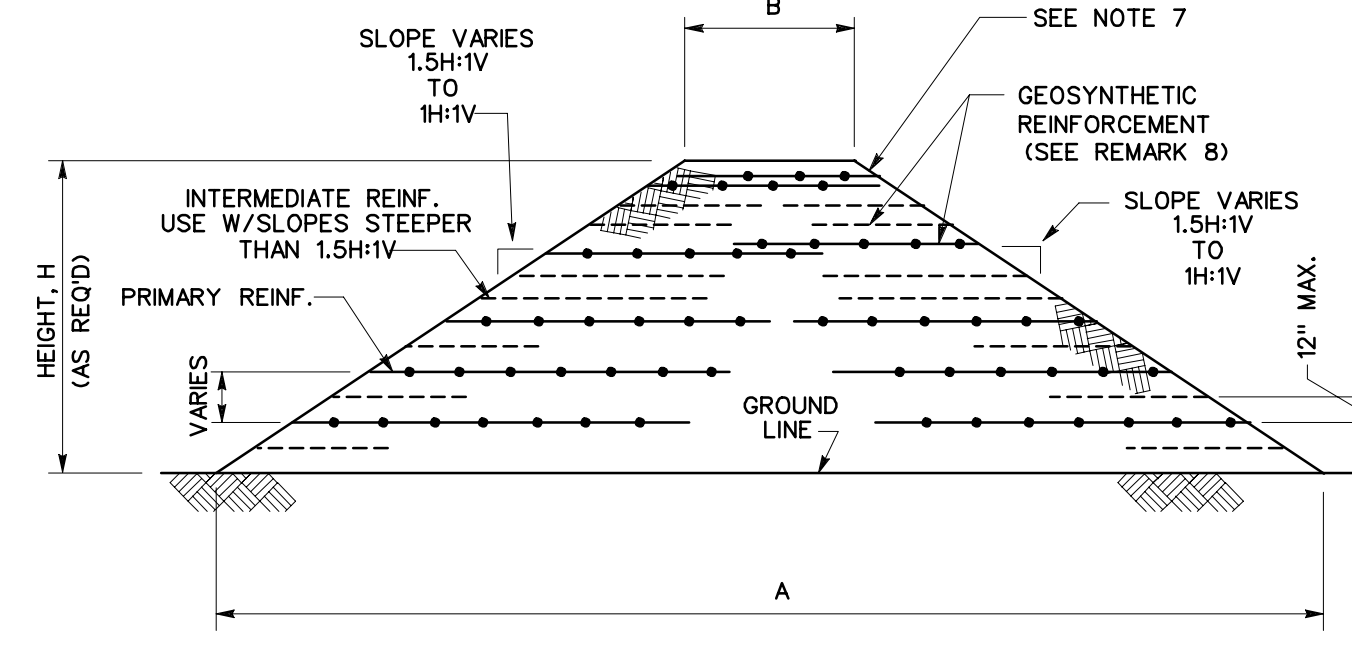


PARTIAL ELEVATION B-B  
N.T.S.

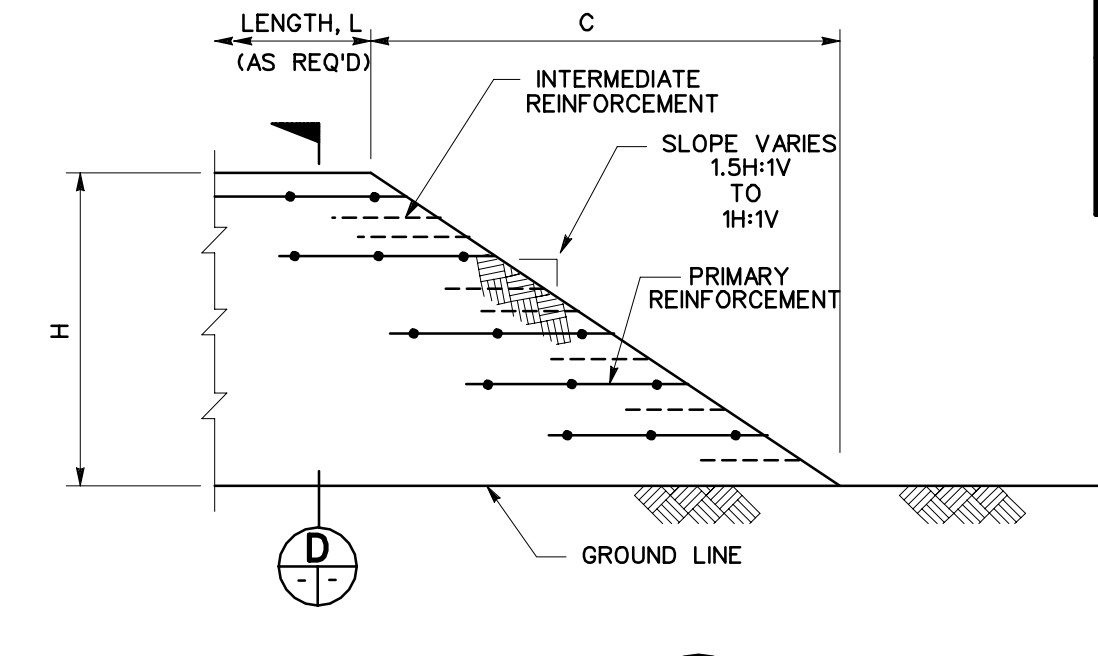


PLAN  
N.T.S.

B1 - EARTH MOUND



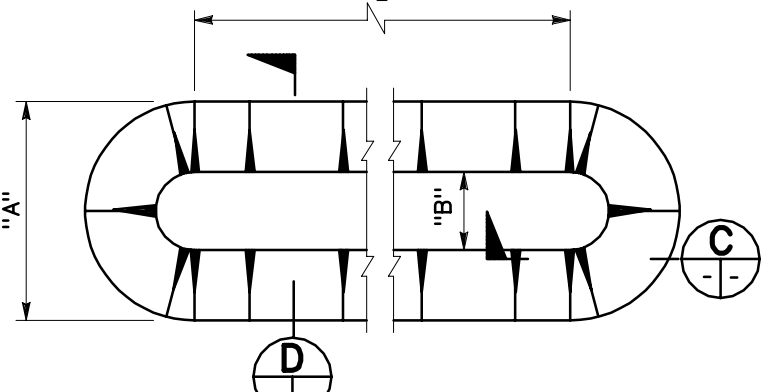
SECTION D-D  
N.T.S.



PARTIAL ELEVATION C-C  
N.T.S.

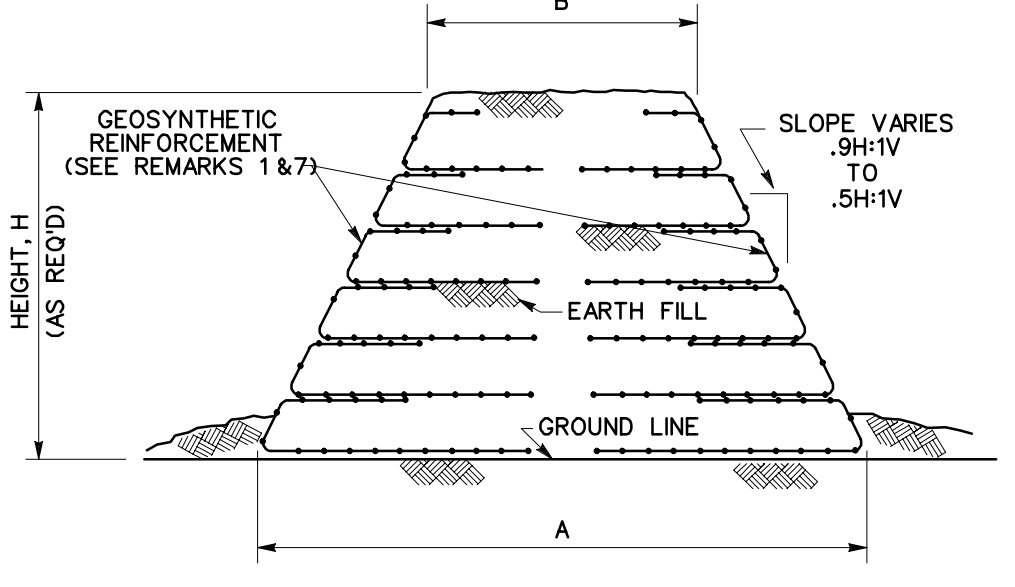
HEIGHT OF MOUND "H"	WIDTH OF BASE "A"	WIDTH AT TOP "B"	WIDTH OF END "C"
10'	1.5H:1V TO 1H:1V	1.5H:1V TO 1H:1V	SLOPE*H"
15'	3.60H TO 2.8H	0.60H TO 0.80H	"
22'	3.60H TO 2.8H	0.60H TO 0.74H	"
30'	3.60H TO 2.7H	0.54H TO 0.70H	"
40'	3.60H TO 2.7H	0.53H TO 0.70H	"

NOTES: 1. DATA SHOWN IS APPROXIMATE.  
2. FOR SLOPES STEEPER THAN 1H:1V USE TYPE B3.

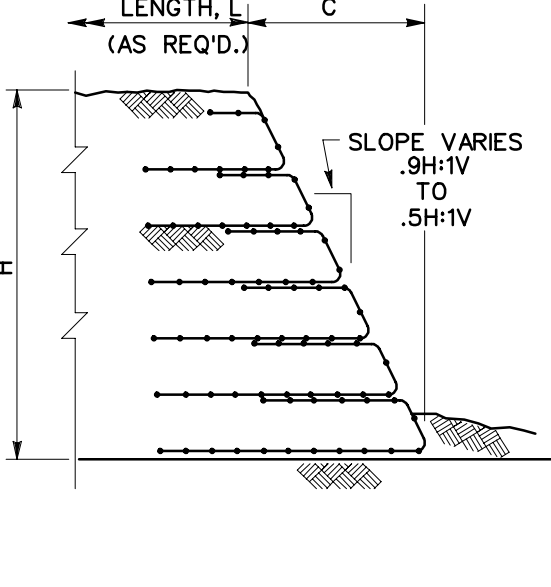


PLAN  
N.T.S.

B2 - REINFORCED EARTH MOUND

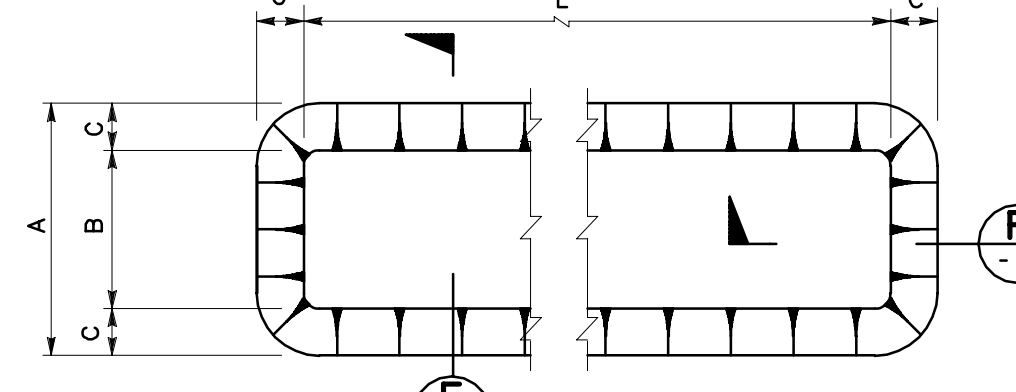


SECTION E-E  
N.T.S.



PARTIAL ELEVATION F-F  
N.T.S.

HEIGHT OF MOUND "H"	WIDTH OF BASE "A"	WIDTH AT TOP "B"	WIDTH OF END "C"
10'	0.5H:1V TO 0.75H:1V	0.90H:1V TO 0.5H:1V	0.75H:1V TO 0.90H:1V
15'	1.80 H	2.25 H	2.50 H
22'			
30'			
40'			



PLAN  
N.T.S.

B3 - WRAP-AROUND REINFORCED EARTH MOUND

ESTIMATED COST, \$	LUMP SUM BARRICADE END
PER LIN. FT. OF CROSS-SECTION, 15 FT. HIGH	
230	2,600

ESTIMATED ERECTION TIME MANHOURS	BARRICADE END
100 LIN. FT. OF CROSS-SECTION, 15 FT. HIGH	
920	90

- REMARKS:
1. CAN BE RAPIDLY CONSTRUCTED WITH UNSKILLED LABOR.
  2. NO HEIGHT OR LENGTH LIMITATIONS.
  3. UNSUITABLE WHERE SPACE IS LIMITED.
  4. REQUIRES SOIL STABILIZATION (SEEDING, ETC.)
  5. REQUIRES REPEATED MAINTENANCE.

ESTIMATED COST, \$	LUMP SUM BARRICADE END
PER LIN. FT. OF CROSS-SECTION, 15 FT. HIGH	
590	4,800

ESTIMATED ERECTION TIME MANHOURS	BARRICADE END
100 LIN. FT. OF CROSS-SECTION, 15 FT. HIGH	
1278	140

- REMARKS:
1. REDUCED FILL REQUIREMENT OVER UNREINFORCED EARTH MOUND.
  2. EFFICIENT CONSTRUCTION AND USE OF LAND.
  3. CAN BE RAPIDLY CONSTRUCTED WITH UNSKILLED LABOR.
  4. ALLOWS CONSTRUCTION OF STEEPER SLOPES THAN THE SOIL'S NATURAL ANGLE OF REPOSE.
  5. NO HEIGHT OR LENGTH LIMITATIONS.
  6. REINFORCEMENT IS LIGHTWEIGHT AND EASILY CUT ON SITE.
  7. REQUIRES SOIL STABILIZATION. GRASS COVER, IF USED, IS DIFFICULT TO MAINTAIN.
  8. GEOSYNTHETIC REINFORCEMENT IS PLASTIC MESH MADE OF HIGH-DENSITY POLYMERS.  
SOURCE: THE TENSAR CORP.  
P.O. BOX 986  
MORROW, GA 30260  
(404) 968-3255

ESTIMATED COST, \$	LUMP SUM BARRICADE END
PER LIN. FT. OF CROSS-SECTION, 15 FT. HIGH	
380	8,700

ESTIMATED ERECTION TIME MANHOURS	BARRICADE END
100 LIN. FT. OF CROSS-SECTION, 15 FT. HIGH	
1,100	270

- REMARKS:
1. A FINE MESH POLYMER NET REQUIRED FOR EROSION CONTROL.
  2. REQUIRES LESS FILL THAN B1 OR B2.
  3. CAN BE LOCATED CLOSE TO SITE BOUNDARIES OR OBSTRUCTIONS.
  4. CAN BE RAPIDLY CONSTRUCTED WITH UNSKILLED LABOR.
  5. REINFORCEMENT IS LIGHTWEIGHT AND EASILY CUT ON SITE.
  6. TEMPORARY SUPPORTS REQUIRED AT FACES DURING CONSTRUCTION.
  7. GEOSYNTHETIC REINFORCEMENT IS PLASTIC MESH MADE OF HIGH-DENSITY POLYMERS.  
SOURCE: THE TENSAR CORP.  
P.O. BOX 986  
MORROW, GA 30260  
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Site adapt A/E 1	U.S. Army Corps of Engineers
Dwn. by 1 RDP	Ckd. by 1 AF
Reviewed by 1	Date 1 2 DEC 68
Approved by 1	Drawing code 1 DEF 142-30-01
Sheet reference number 1	Design file no. 1 57724
Rev	Rev
3	3 of 13



CORPS OF ENGINEERS

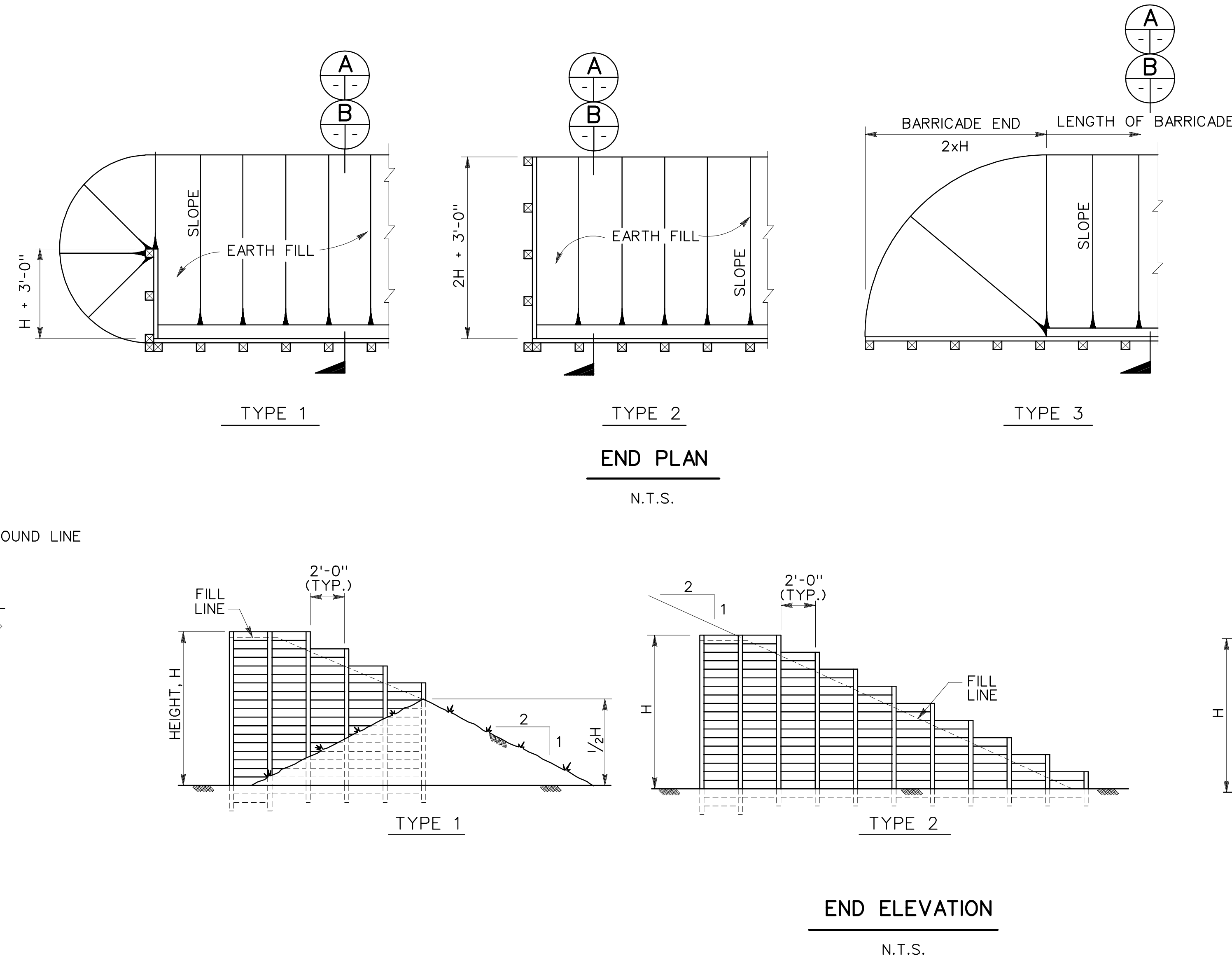
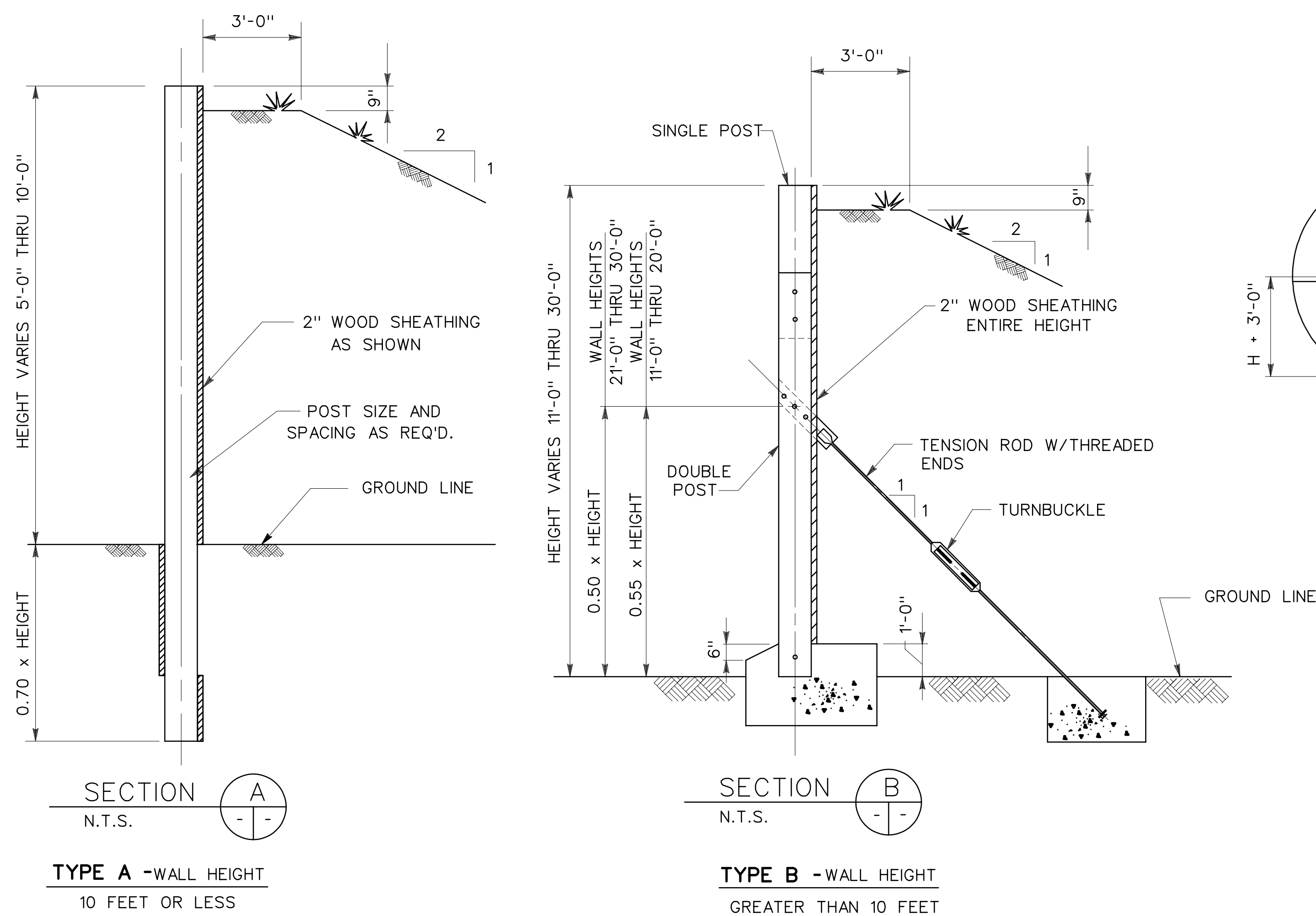
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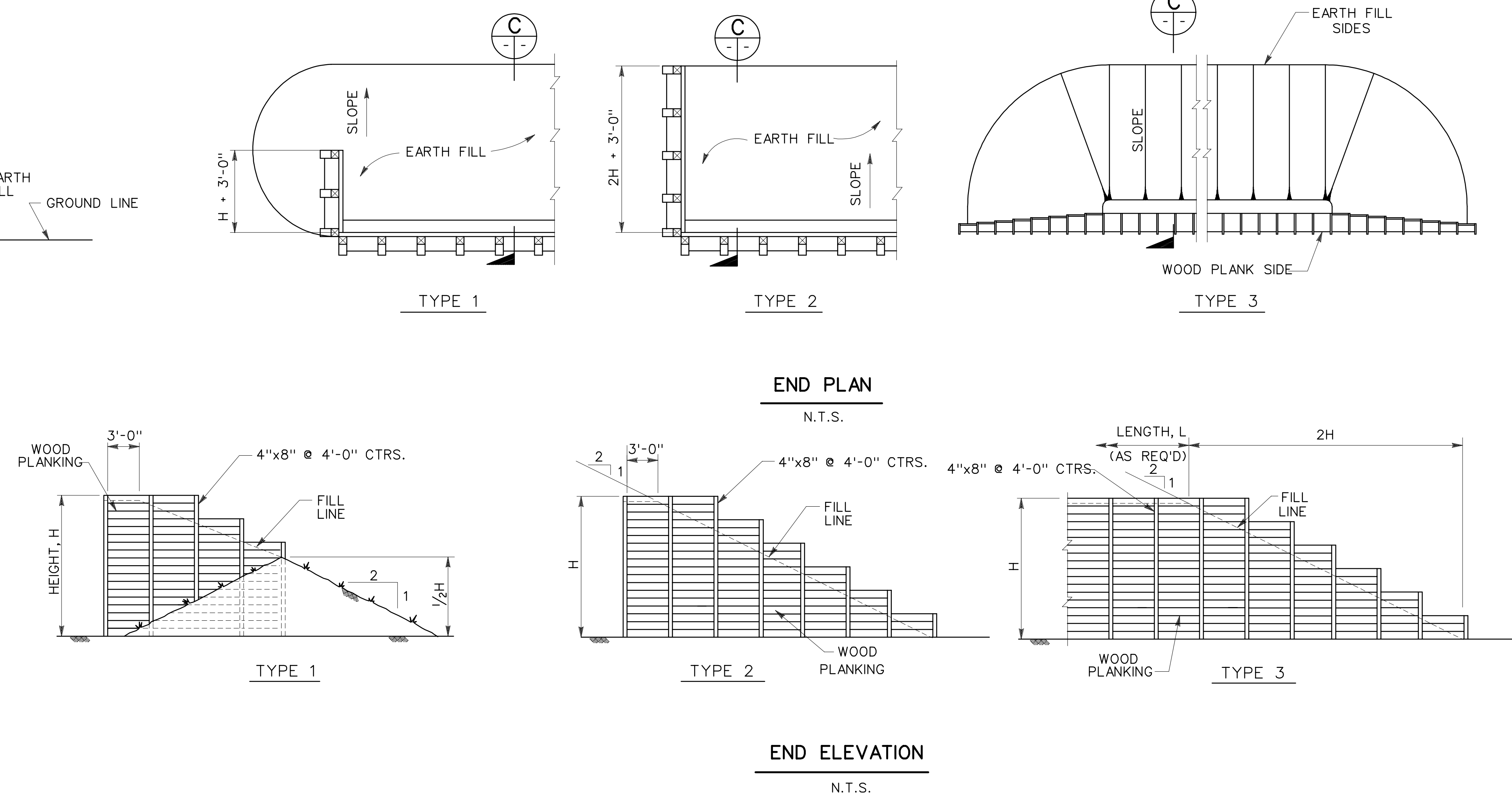
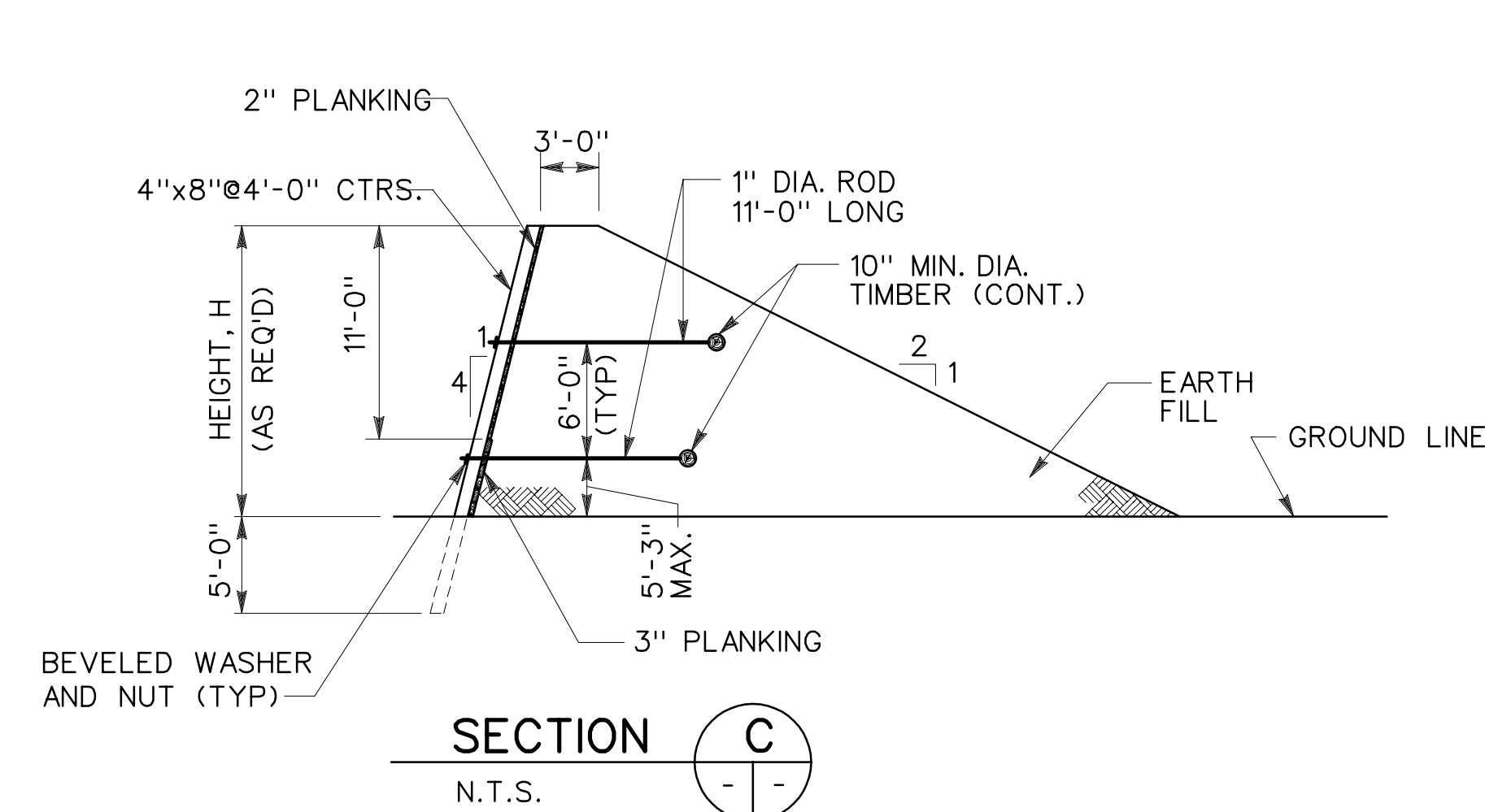
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U.S. ARMY



B4 - TIMBER - SINGLE REVETTED

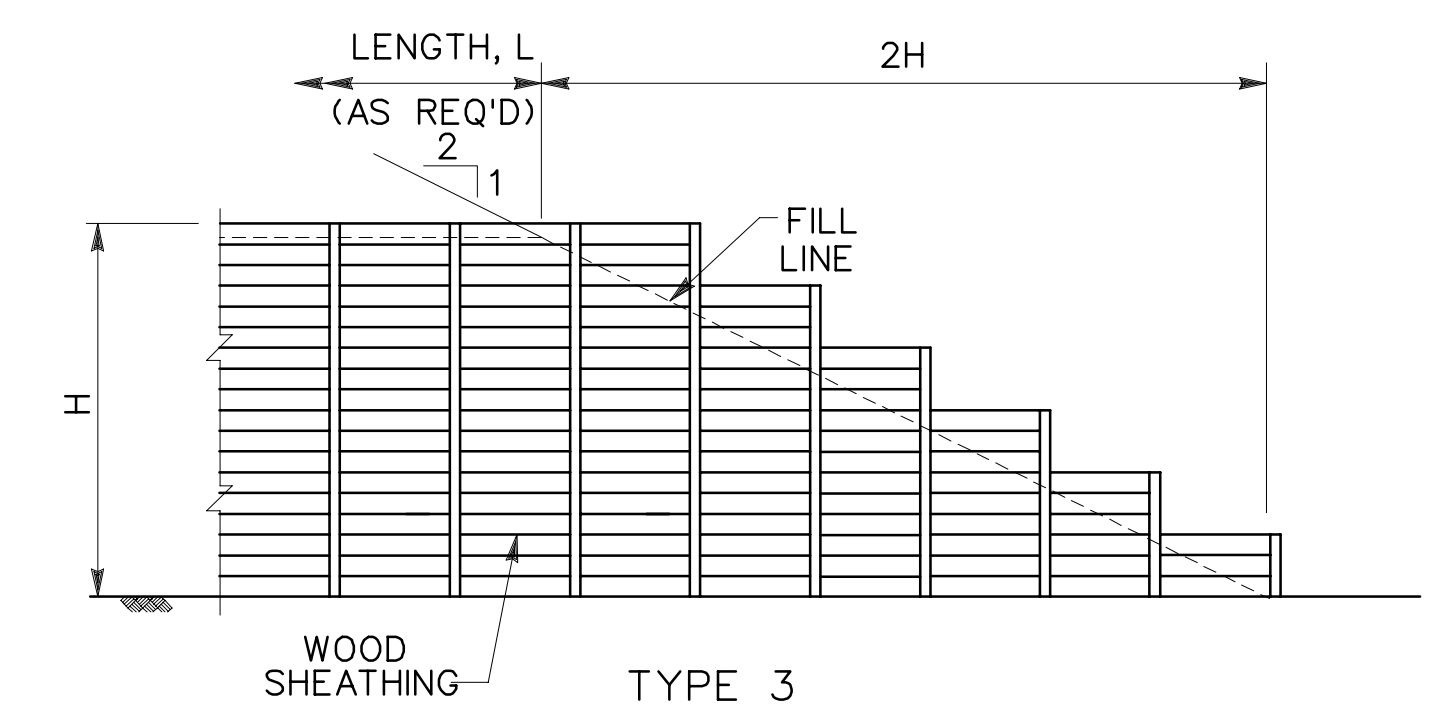


B5 - TIMBER - SINGLE REVETTED

ESTIMATED COST, \$			
PER LIN. FT. OF CROSS SECTION 15 FT. HIGH	LUMP SUM END		
	TYPE 1	TYPE 2	TYPE 3
130	2,100	2,100	2,150
ESTIMATED ERECTION TIME MANHOURS			
100 LIN. FT. OF CROSS SECTION 15 FT. HIGH	END TYPE	END TYPE	END TYPE
390	71	60	119

## REMARKS:

1. ALL LUMBER SHALL BE PRESSURE TREATED WITH PRESERVATIVES.
2. CAN BE RAPIDLY CONSTRUCTED WITH UNSKILLED LABOR.
3. REQUIRES SOIL STABILIZATION (SEEDING, ETC.)
4. AESTHETICALLY NOT PLEASING.
5. REQUIRES REPEATED MAINTENANCE.

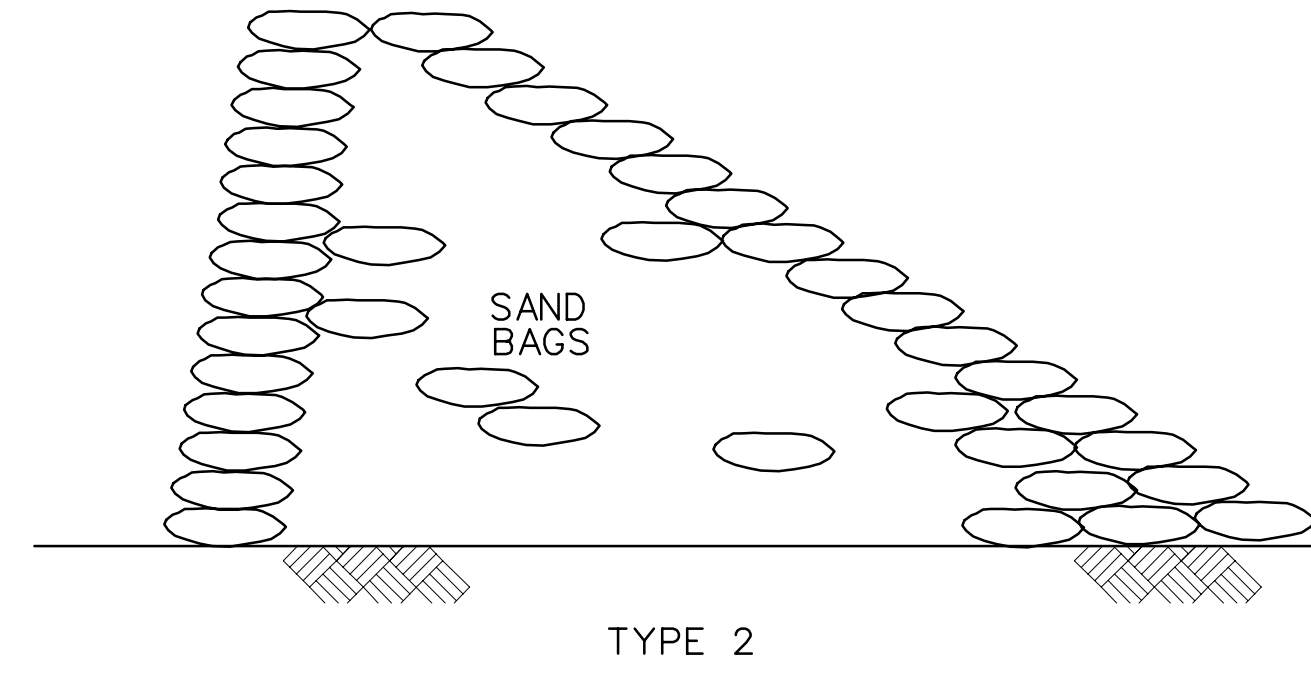
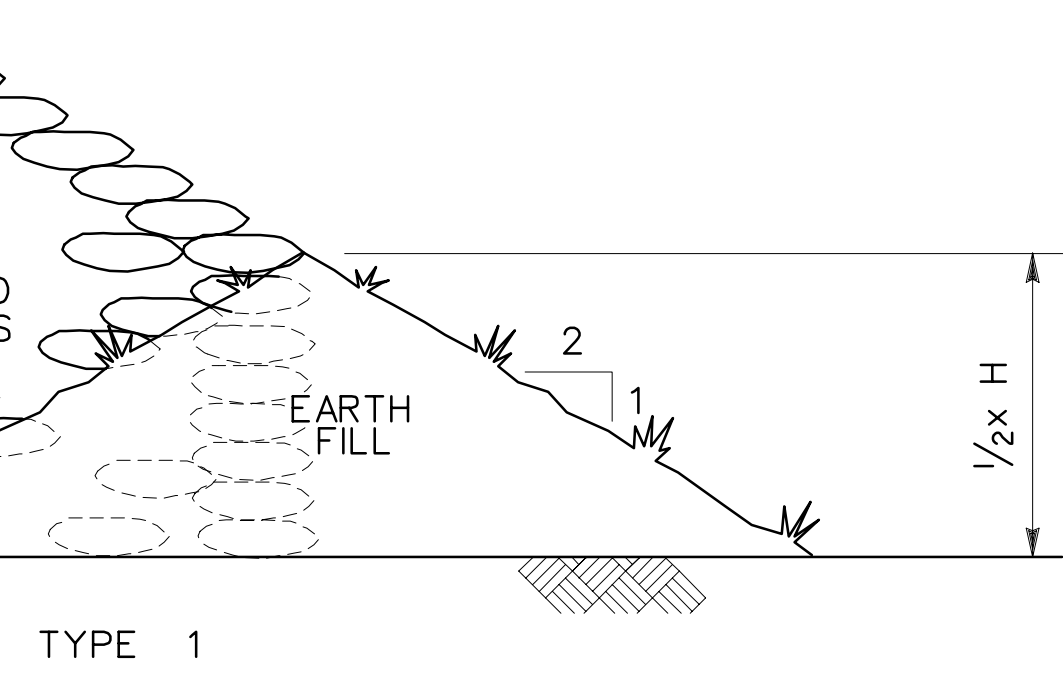
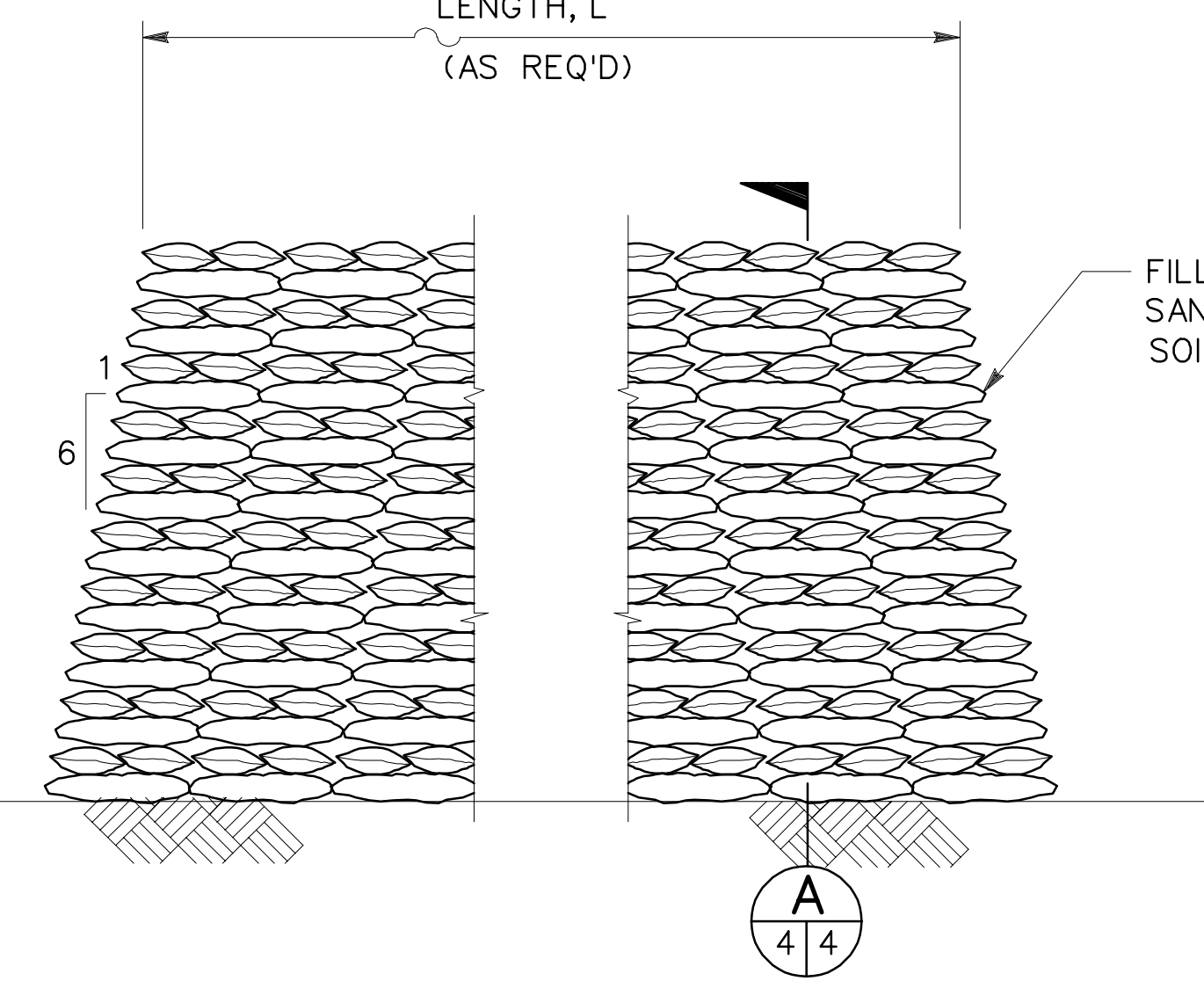
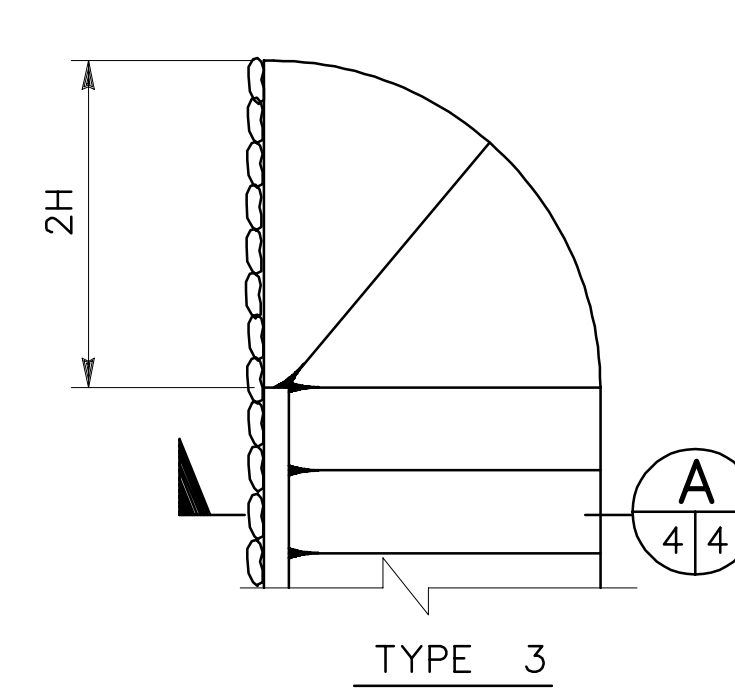
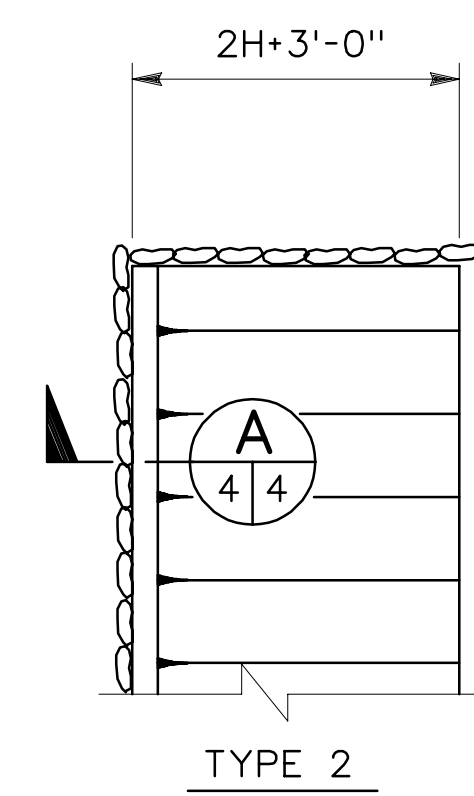
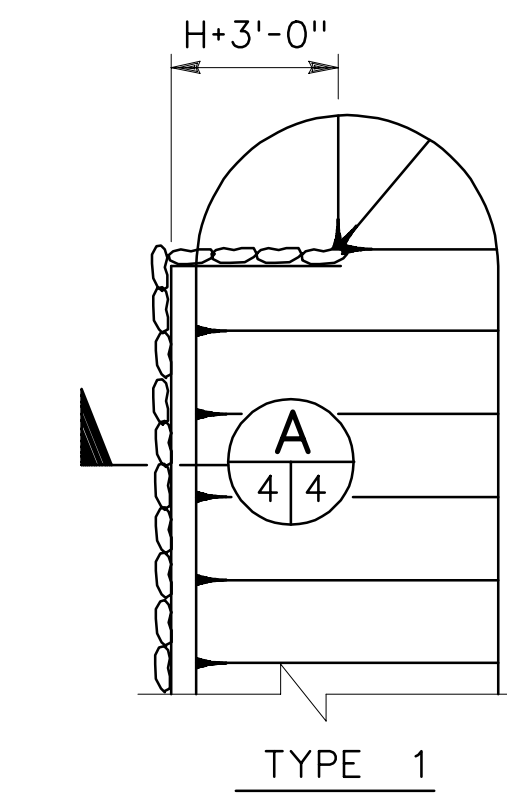
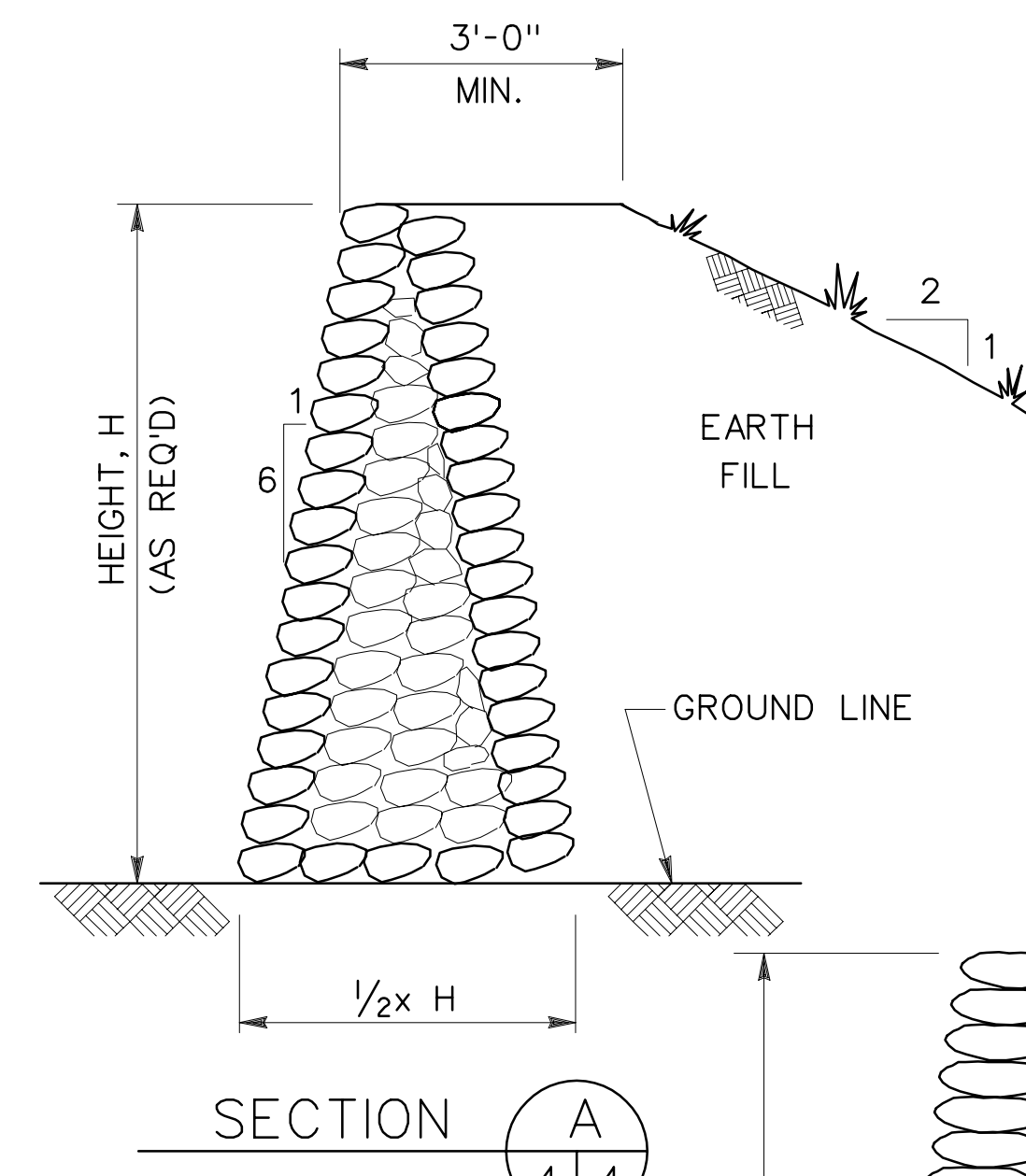


ESTIMATED COST, \$			
PER LIN. FT. OF CROSS SECTION 15 FT. HIGH	LUMP SUM END		
	TYPE 1	TYPE 2	TYPE 3
150	2,600	3,600	3,700
ESTIMATED ERECTION TIME MANHOURS			
100 LIN. FT. OF CROSS SECTION 15 FT. HIGH	END TYPE	END TYPE	END TYPE
410	92	80	110

## REMARKS:

SEE ABOVE (B4)

SHEET TOTAL CHANGED		22NOV88
Symbol	Description	Date Approved
U.S. ARMY ENGINEER DIVISION, HUNTSVILLE		
CORPS OF ENGINEERS		
HUNTSVILLE, ALABAMA		
Site adapt A/E :		
Dwn. by : RDP		Ckd. by : AF
Reviewed by :		Date : 2 DEC 88
Approved by :		Drawing code : DEF 149-30-01
BARRICADES		Sheet reference number : 4
Design file no. : 51725		Rev. : 1
Sheet : 4 of 13		

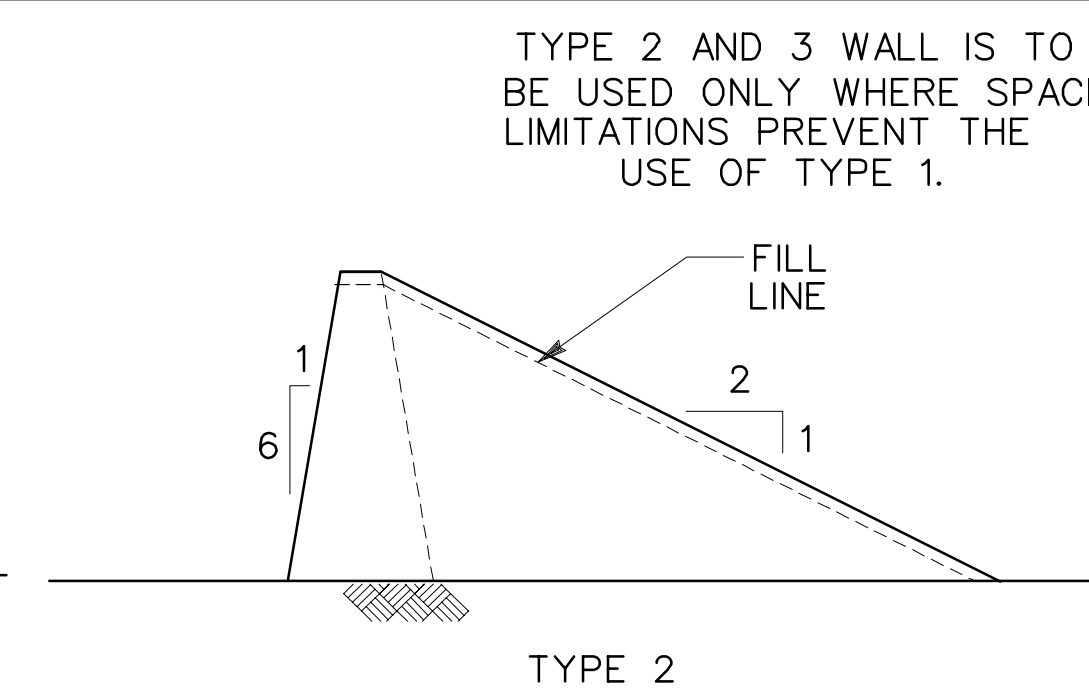
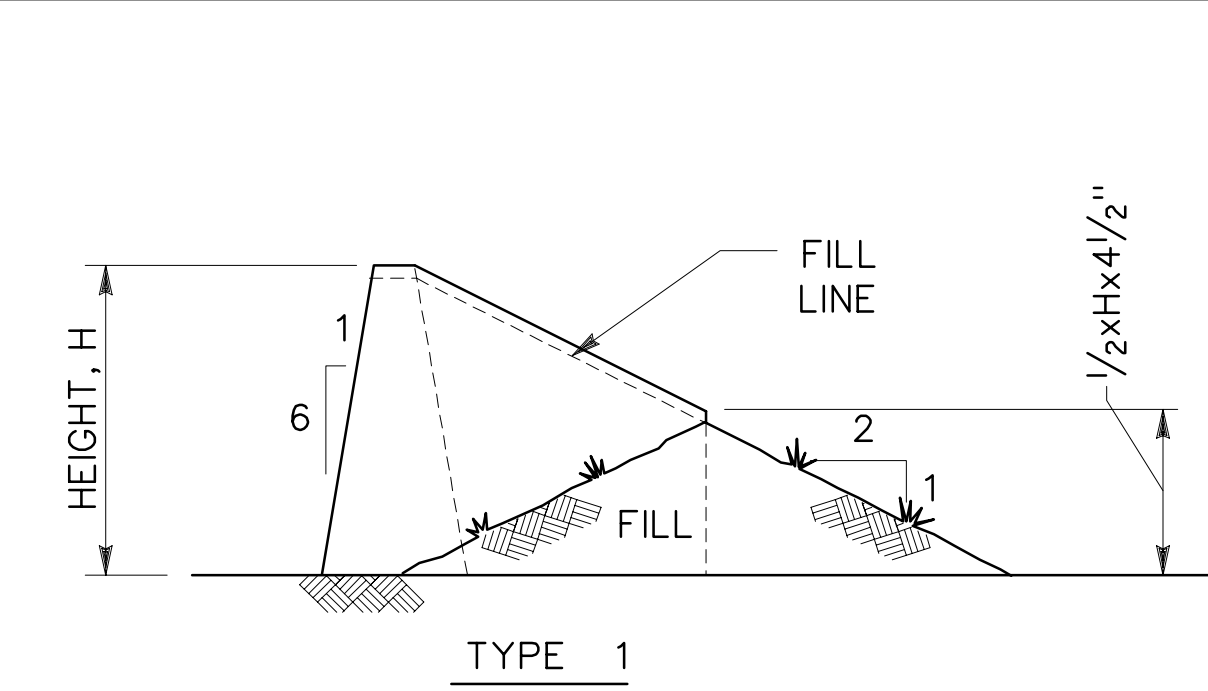
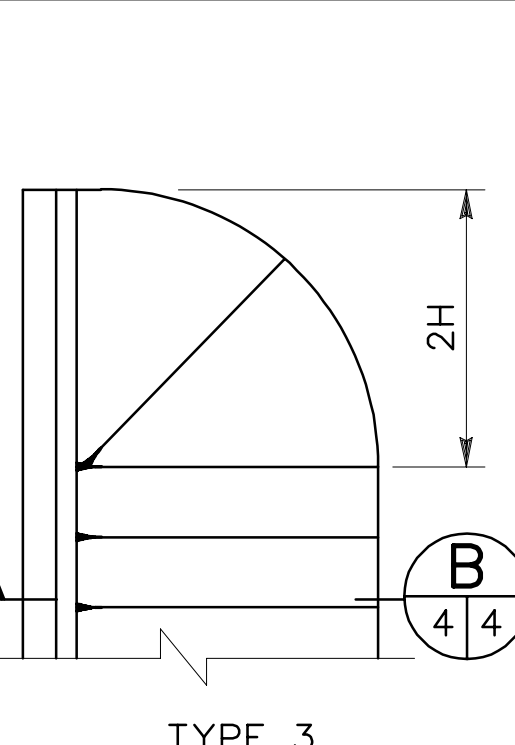
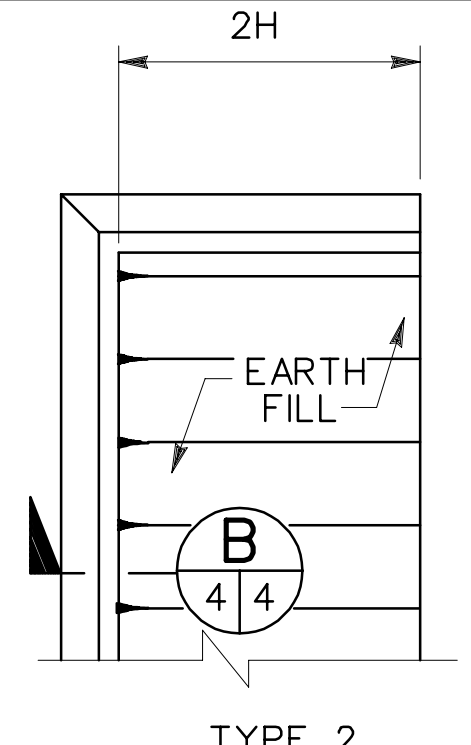
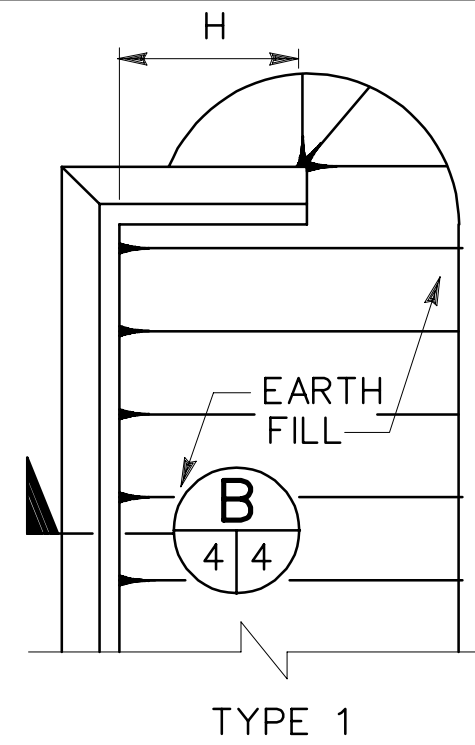
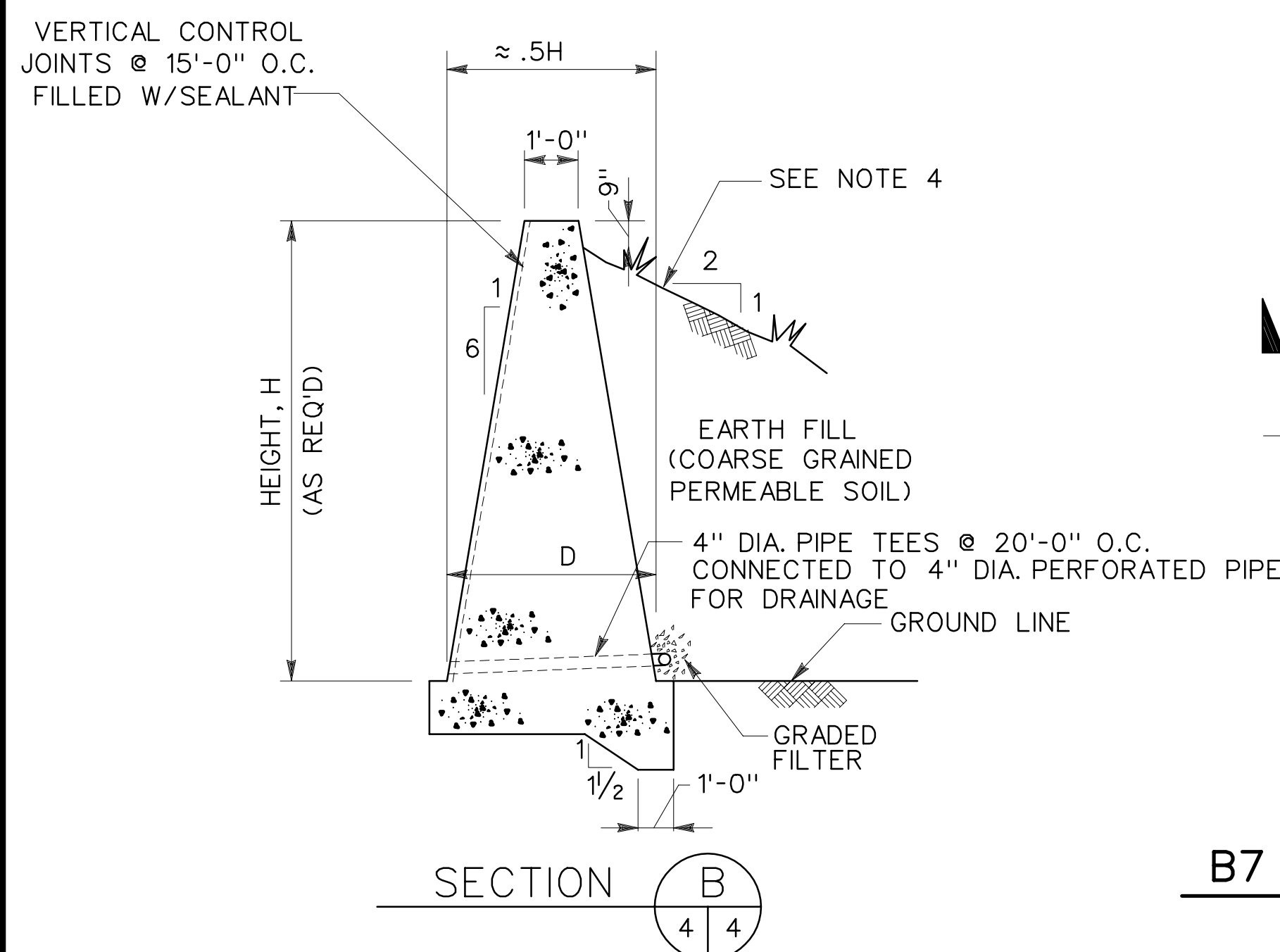


END PLAN

FRONT ELEVATION (TYPE 2 SHOWN)

END ELEVATION

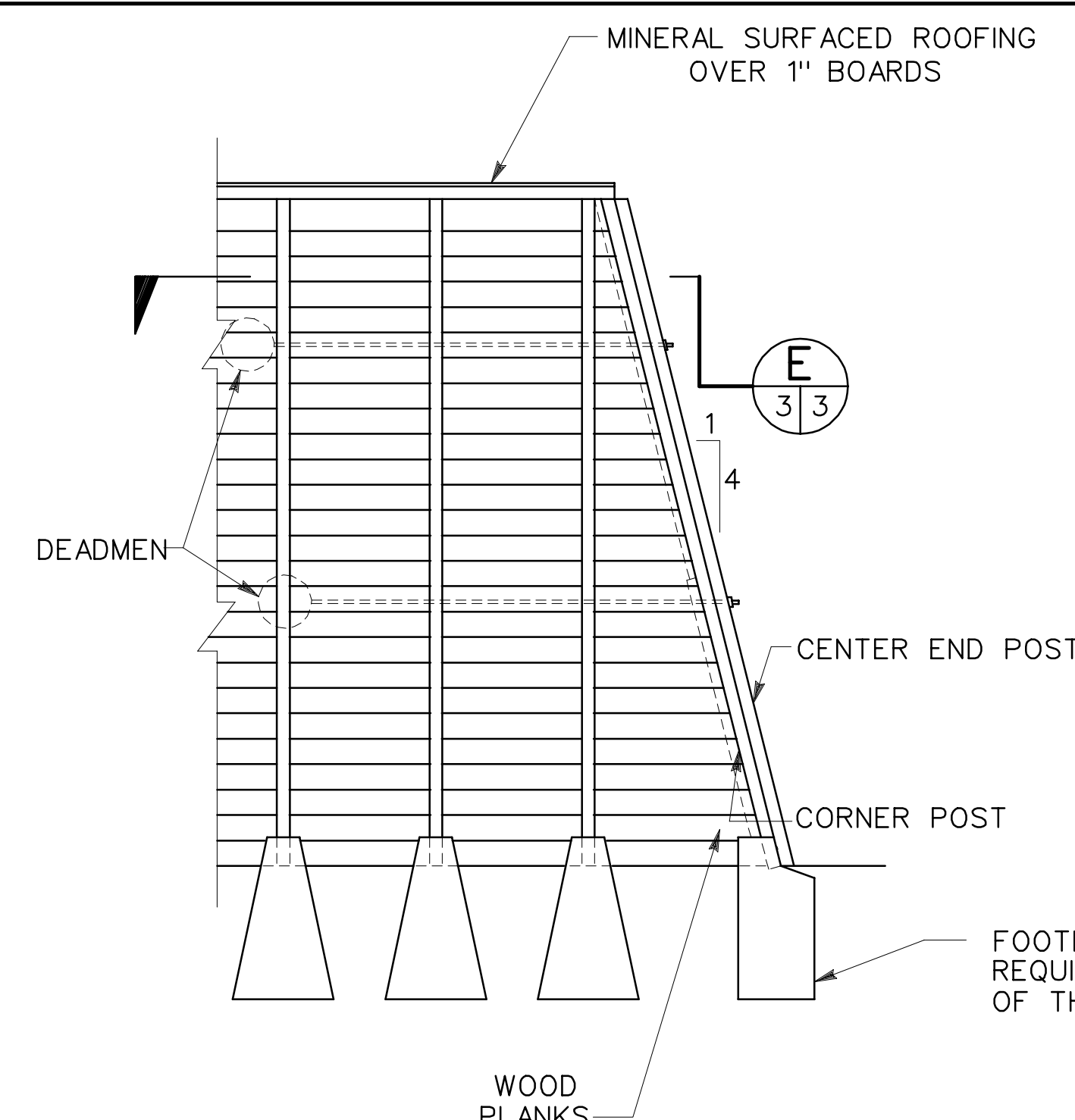
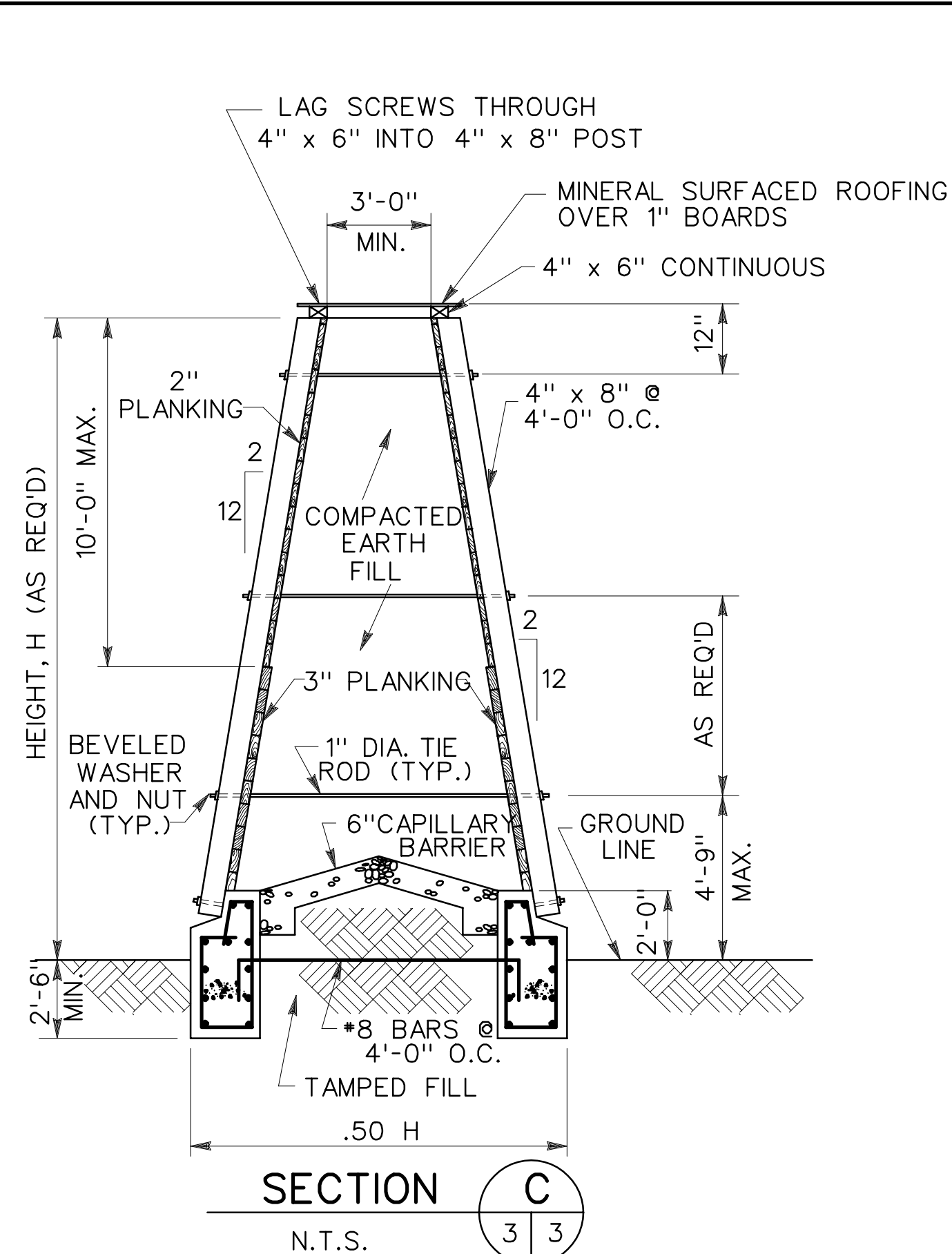
B6 - SAND BAG - SINGLE REVETTED



END PLAN

END ELEVATION

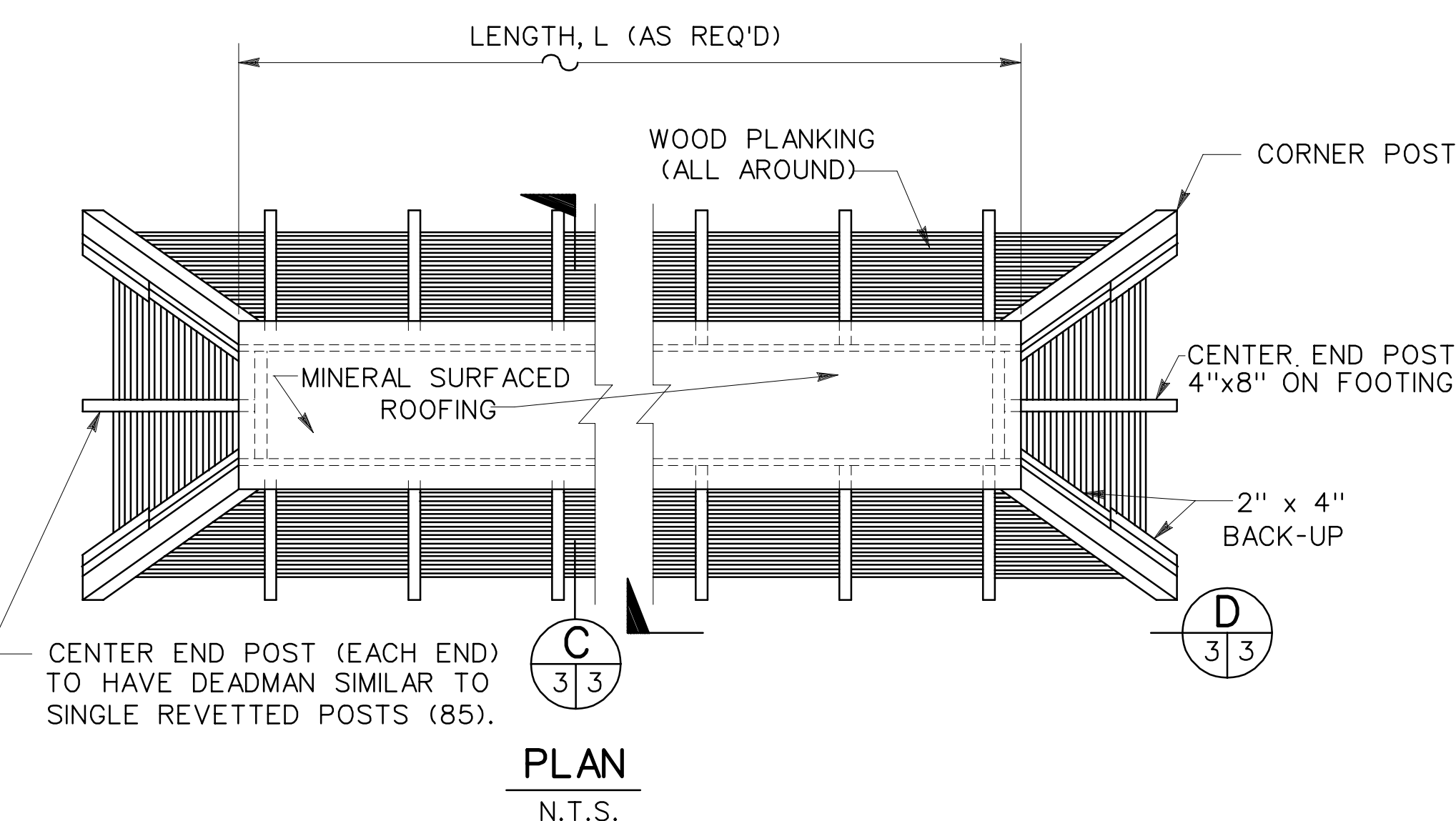
B7 - CONCRETE GRAVITY WALL - SINGLE REVETTED



PARTIAL ELEVATION D

FOOTING SIZE SHALL SATISFY STABILITY REQUIREMENT AND MUST CONFORM TO RECOMMENDATIONS OF THE GEOTECHNICAL REPORT

B8 - TIMBER - DOUBLE REVETTED



PLAN

N.T.S.

ESTIMATED COST, \$			
PER LIN. FT. OF CROSS SECTION 15 FT. HIGH	LUMP SUM END		
430	TYPE 1	TYPE 2	TYPE 3
	4,300	6,100	6,600

ESTIMATED ERECTION TIME MANHOURS			
100 LIN. FT. OF CROSS SECTION 15 FT. HIGH	END TYPE	END TYPE	END TYPE
1,970	200	290	310

## REMARKS:

- SANDBAGS MAY BECOME SECONDARY FRAGMENTS AS A RESULT OF HIGH OVERPRESSURES.
- AESTHETICALLY NOT PLEASING.
- SIMPLE TO CONSTRUCT WITH UNSKILLED LABOR.
- SUITABLE FOR REMOTE LOCATIONS.
- SANDBAGS WILL DETERIORATE WITH TIME.
- REQUIRES SLOPE STABILIZATION IF CONSTRUCTED FOR OTHER THAN TEMPORARY USE.

ESTIMATED COST, \$ (W/O EARTH FILL)			
PER LIN. FT. OF CROSS SECTION 15 FT. HIGH	LUMP SUM END		
610	TYPE 1	TYPE 2	TYPE 3
	8,600	15,400	16,500

ESTIMATED ERECTION TIME MANHOURS			
100 LIN. FT. OF CROSS SECTION 15 FT. HIGH	END TYPE	END TYPE	END TYPE
1,670	320	560	600

## REMARKS:

- CAN BE BUILT WITH UNSKILLED LABOR AND LOCALLY AVAILABLE MATERIALS.
- EXPOSED AGGREGATE FINISH POSSIBLE.
- DELETE IF ONLY FRAGMENT RESISTANT REQUIRED.
- IF EARTH FILL IS PLACED BEHIND WALL, STABILITY OF WALL MUST BE CHECKED ON A CASE-BY-CASE BASIS.

ESTIMATED COST, \$	
PER LIN. FT. OF CROSS SECTION 15 FT. HIGH	LUMP SUM BARRICADE END
280	6,900

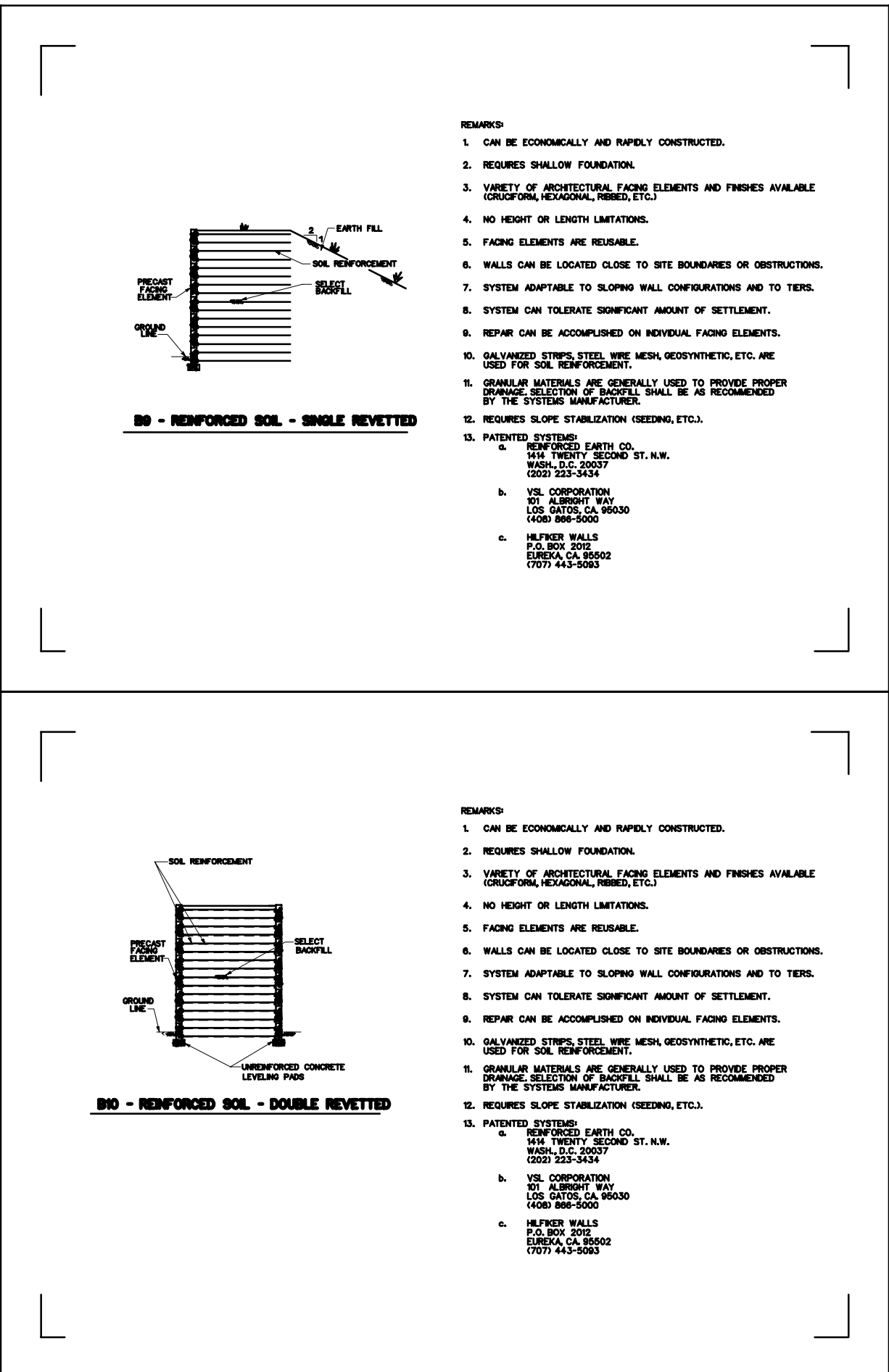
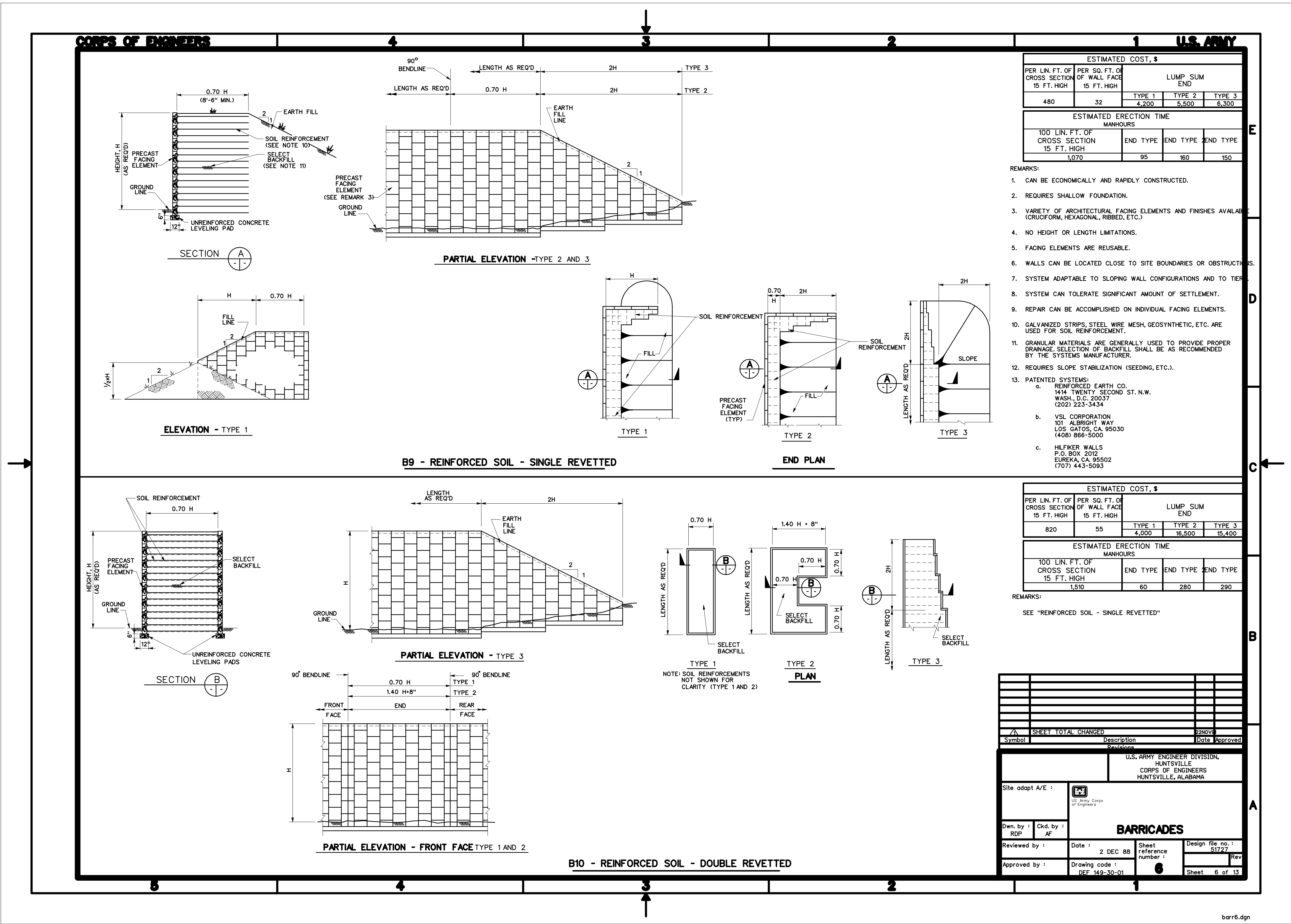
ESTIMATED ERECTION TIME MANHOURS	
100 LIN. FT. OF CROSS SECTION 15 FT. HIGH	BARRICADE END
850	170

## REMARKS:

- ALL LUMBER SHALL BE PRESSURE TREATED WITH PRESERVATIVES.
- CAN BE RAPIDLY CONSTRUCTED WITH UNSKILLED LABOR.
- CAN BE LOCATED CLOSE TO SITE BOUNDARIES OR RESTRICTIONS.
- CAN TOLERATE SIGNIFICANT AMOUNT OF SETTLEMENT.
- AESTHETICALLY NOT PLEASING.
- REQUIRES REPEATED MAINTENANCE.

Symbol	Description	Revisions
Δ	SHEET TOTAL CHANGED	22NOV93

U.S. ARMY ENGINEER DIVISION, HUNTSVILLE, ALABAMA	
Site adapt A/E :	U.S. Army Corps of Engineers
Dwn. by : RDP	Ckd. by : AF
Reviewed by :	Date : 2 DEC 88
Approved by :	Drawing code : DEF 149-30-01
BARRICADES	
Design file no. : 51726	Rev. : 5
Sheet : 5 of 13	





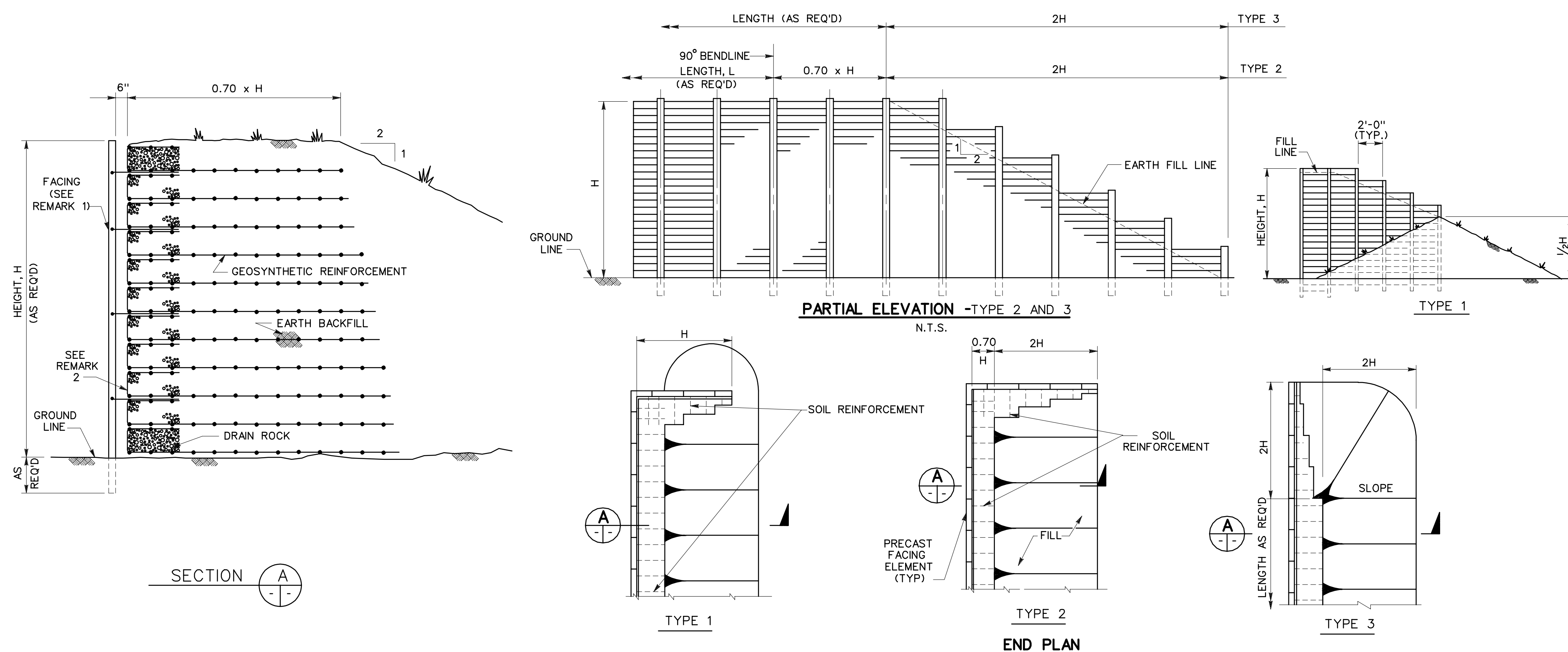


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**U.S. ARMY**



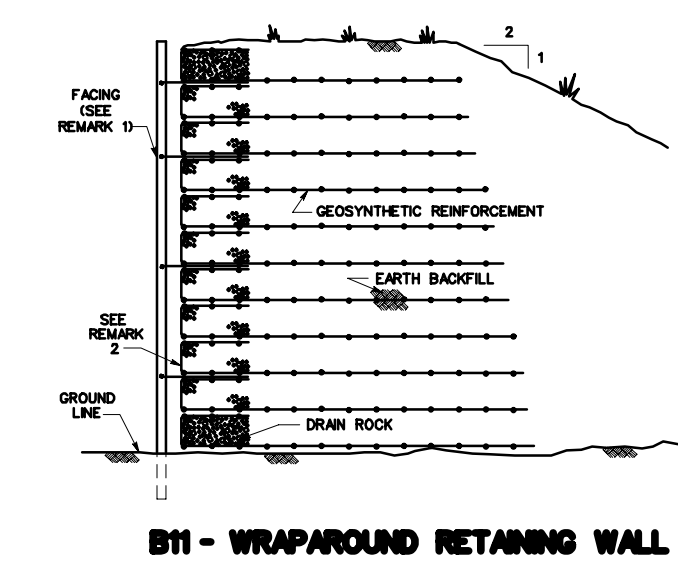
ESTIMATED COST, \$						
PER LIN. FT. OF CROSS SECTION 15 FT. HIGH	PER SQ. FT. OF WALL FACE 15 FT. HIGH	LUMP SUM END				
		TYPE 1 6,300	TYPE 2 6,900	TYPE 3 7,500		
330	22					

ESTIMATED ERECTION TIME MANHOURS			
100 LIN. FT. OF CROSS SECTION 15 FT. HIGH	END TYPE	END TYPE	END TYPE
1,040	160	160	190

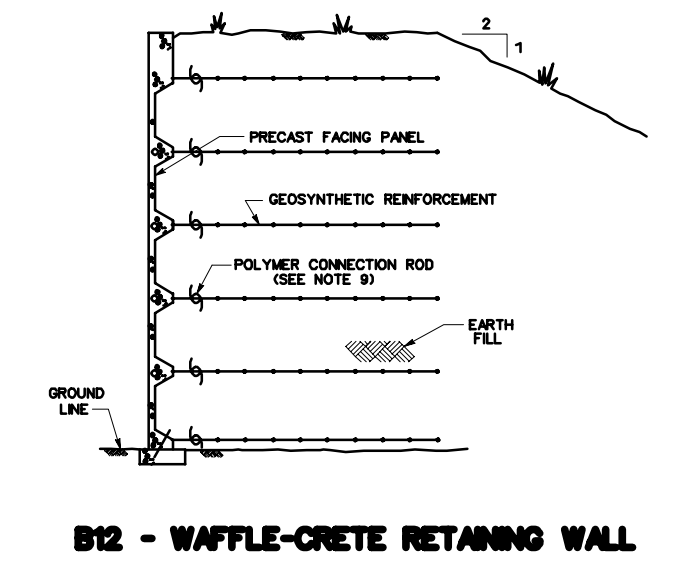
**REMARKS:**

1. FACING CAN BE SELECTED TO ACHIEVE DESIRED ARCHITECTURAL FINISH. EXAMPLE:  
GOLDEN PILING AND LAGGING FACING, PRECAST CONCRETE, ETC.
2. GEOSYNTHETIC FINE MESH IS USED TO CONTAIN SOIL OR SAND FILL.
3. CAN BE ECONOMICALLY AND RAPIDLY CONSTRUCTED.
4. REQUIRES SHALLOW FOUNDATION.
5. SYSTEM CAN TOLERATE SIGNIFICANT AMOUNT OF SETTLEMENT.
6. REQUIRES SLOPE STABILIZATION (SEEDING, ETC.).
7. GEOSYNTHETIC REINFORCEMENT IS PLASTIC MESH MADE OF HIGH DENSITY POLYMER.
8. SUPPLIER:  
TENSAR CORPORATION  
P.O. BOX 49526  
ATLANTA, GA 30359  
(404) 325-0814



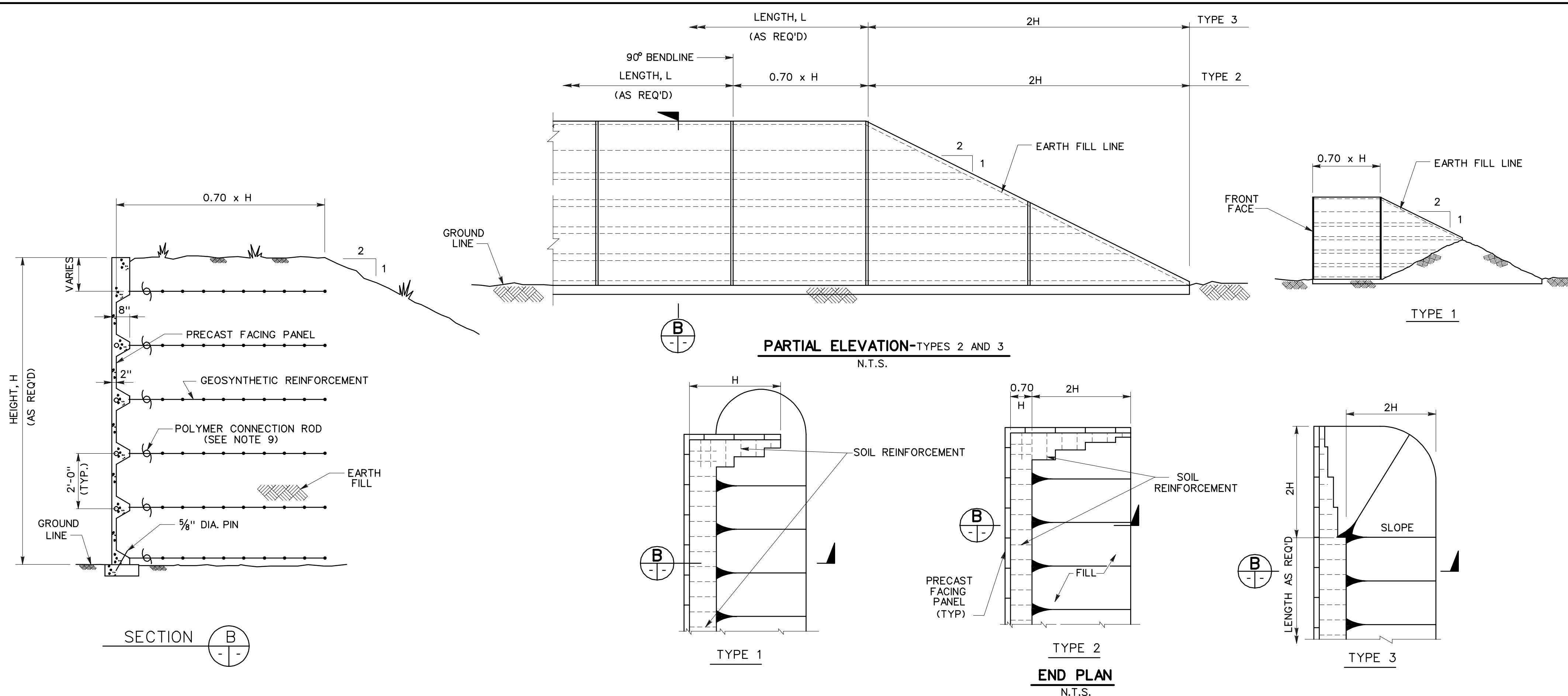
**REMARKS:**

1. FACING CAN BE SELECTED TO ACHIEVE DESIRED ARCHITECTURAL FINISH. EXAMPLES:  
SOLDER PILE AND LAGGING FACING, PRECAST CONCRETE, ETC.
2. GEOSYNTHETIC FINE MESH IS USED TO CONTAIN SOIL OR SAND FILL.
3. CAN BE ECONOMICALLY AND RAPIDLY CONSTRUCTED.
4. REQUIRES SHALLOW FOUNDATION.
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8. SUPPLIER:  
TENAR CORPORATION  
P.O. BOX 49526  
ATLANTA, GA 30359  
(404) 325-0814



**REMARKS:**

- 1. PRECAST FACING PANELS ARE LIGHTWEIGHT.
- 2. PANELS MUST BE EXTERNALLY BRACED DURING CONSTRUCTION.
- 3. WALL REQUIRES BATTER OF 1/4" PER FOOT.
- 4. VARIETY OF DIFFERENT PRECAST FACING PANELS ARE AVAILABLE, WITH WIDE VARIETY OF FINISHES.
- 5. LIMITED TO 20 FEET IN HEIGHT.
- 6. PROPRIETARY WAFFLE-CRETE PANELS SHOWN. OTHER FACING SYSTEMS MAY BE SUBSTITUTED.
- 7. REQUIRES SLOPE STABILIZATION (SEEDING, ETC.).
- 8. GEOSYNTHETIC REINFORCEMENT IS PLASTIC MESH MADE OF HIGH DENSITY POLYESTER.
- 9. POLYMER CONNECTION ROD IS USED TO CONNECT THE PRECAST FACING PANEL TABS TO THE GEOSYNTHETIC REINFORCEMENTS.
- 7. SUPPLIER:  
TENSAR CORPORATION  
P.O. BOX 449028  
ATLANTA, GA 30359  
(404) 325-0014



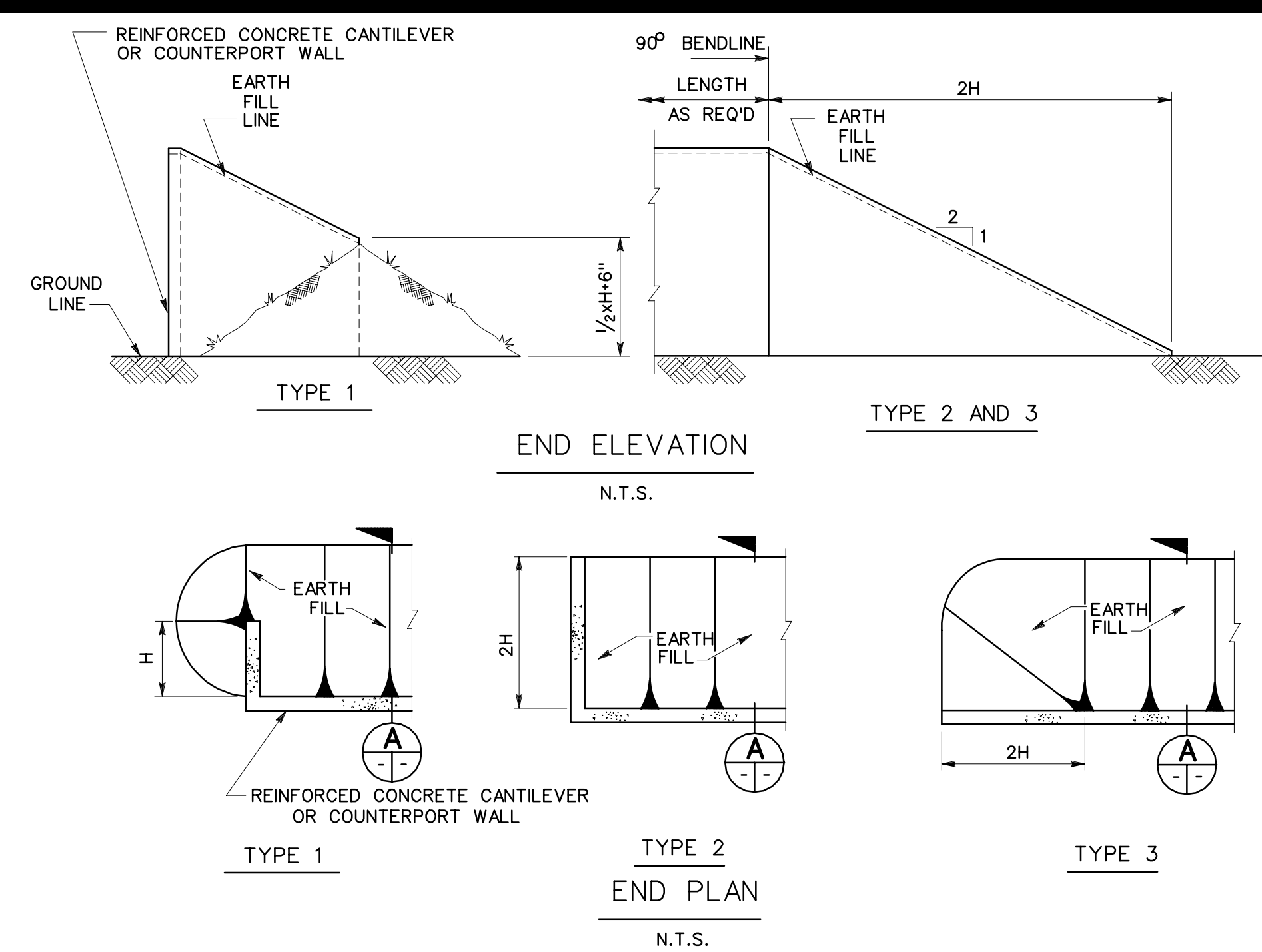
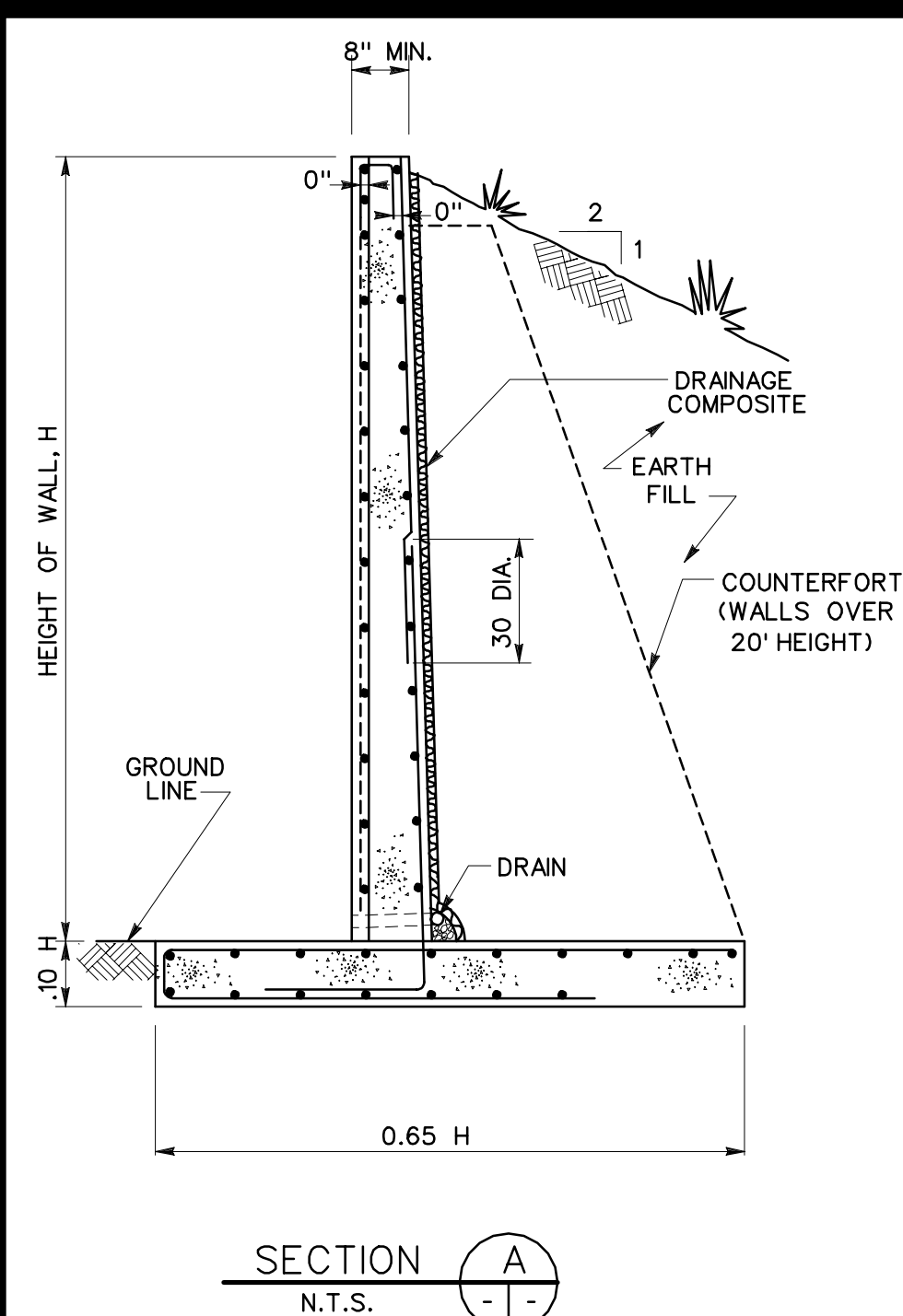
ESTIMATED COST, \$				
PER LIN. FT. OF CROSS SECTION 15 FT. HIGH	PER SQ. FT. OF FACE OF WALL 15 FT. HIGH	LUMP SUM END		
540	36	TYPE 1 4,120	TYPE 2 11,800	TYPE 3 7,420
ESTIMATED ERECTION TIME MANHOURS				
100 LIN. FT. OF CROSS SECTION 15 FT. HIGH	END TYPE	END TYPE	END TYPE	END TYPE
122	100	230	160	

**REMARKS:**

1. PRECAST FACING PANELS ARE LIGHTWEIGHT.
2. PANELS MUST BE EXTERNALLY BRACED DURING CONSTRUCTION.
3. WALL REQUIRES BATTER OF 1/8" PER FOOT.
4. VARIETY OF DIFFERENT PRECAST FACING PANELS ARE AVAILABLE WITH WIDE VARIETY OF FINISHES.
5. LIMITED TO 20 FEET IN HEIGHT.
6. PROPRIETARY WAFFLE-CRETE PANELS SHOWN. OTHER FACING SYSTEMS MAY BE SUBSTITUTED.
7. REQUIRES SLOPE STABILIZATION (SEEDING, ETC.).
8. GEOSYNTHETIC REINFORCEMENT IS PLASTIC MESH MADE OF HIGH DENSITY POLYMER.
9. POLYMER CONNECTION ROD IS USED TO CONNECT THE PRECAST FACING PANEL TABS TO THE GEOSYNTHETIC REINFORCEMENTS.
7. SUPPLIER:  
TENSAR CORPORATION  
P.O. BOX 49526  
ATLANTA, GA. 30359  
(404) 325-0814

[illegible]

barr7.dgn



B13 - CANTILEVER RETAINING WALL

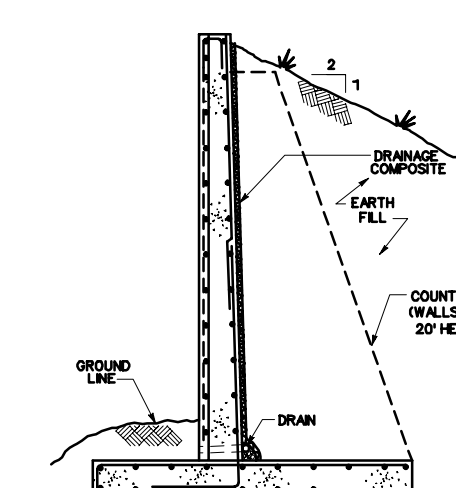
ESTIMATED COST, \$			
PER LIN. FT. OF CROSS SECTION 15 FT. HIGH	LUMP SUM END		
	TYPE 1	TYPE 2	TYPE 3
355	5,600	6,300	7,400

ESTIMATED ERECTION TIME MANHOURS			
100 LIN. FT. OF CROSS SECTION 15 FT. HIGH	END TYPE	END TYPE	END TYPE
	1400	150	180
			220

## REMARKS:

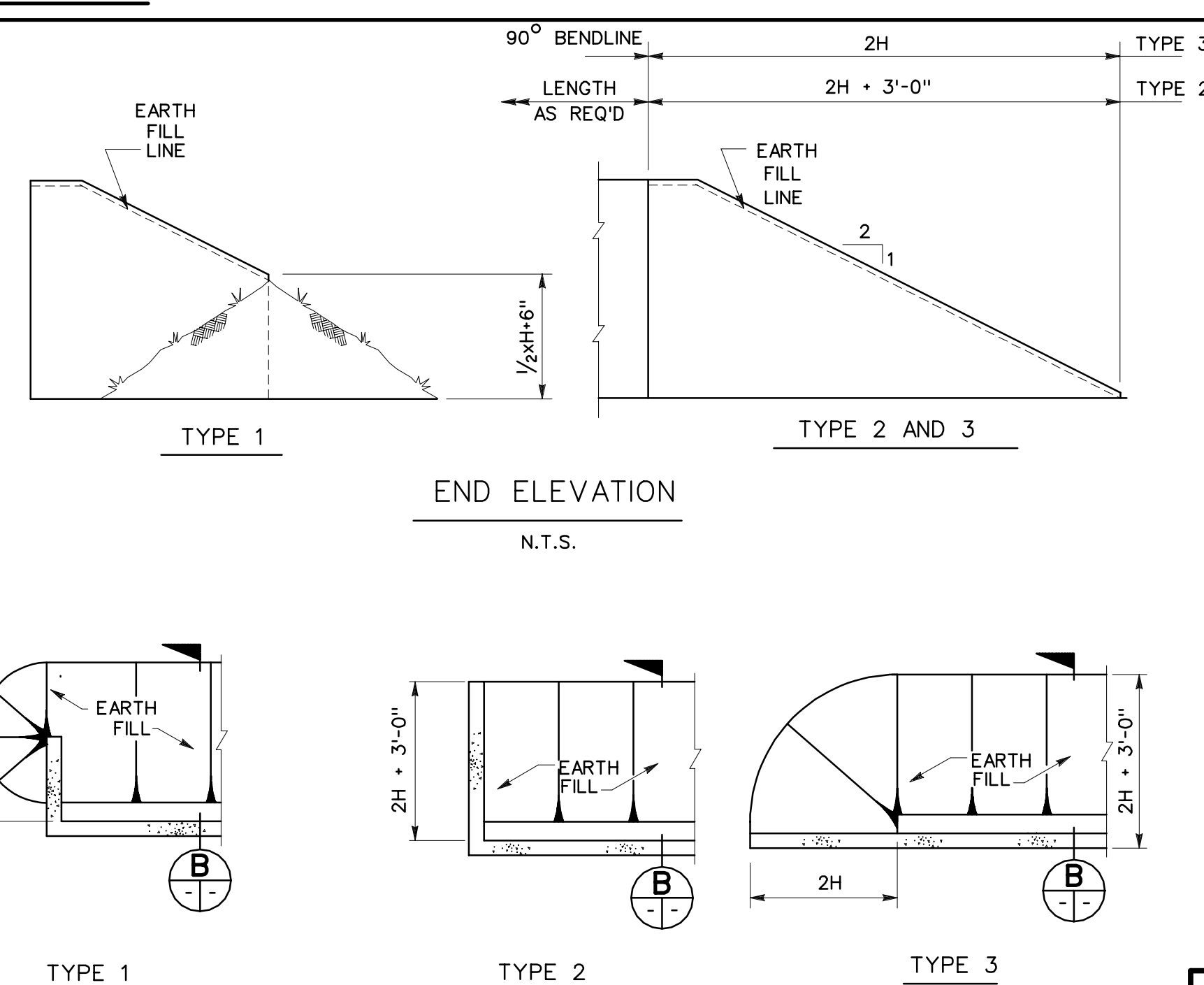
1. REQUIRES EXTENSIVE FORMING AND CONSTRUCTION TIME.
2. NOT COST EFFECTIVE FOR HIGH WALLS.
3. CONCRETE THICKNESS, REINFORCING STEEL, AND TOE LENGTH MUST BE DESIGNED ON A CASE-BY-CASE BASIS.



**B13 - CANTILEVER RETAINING WALL**

## REMARKS:

1. REQUIRES EXTENSIVE FORMING AND CONSTRUCTION TIME.
2. NOT COST EFFECTIVE FOR HIGH WALLS.
3. CONCRETE THICKNESS, REINFORCING STEEL, AND TOE LENGTH MUST BE DESIGNED ON A CASE-BY-CASE BASIS.



B14 - PRECAST DOUBLE TEES

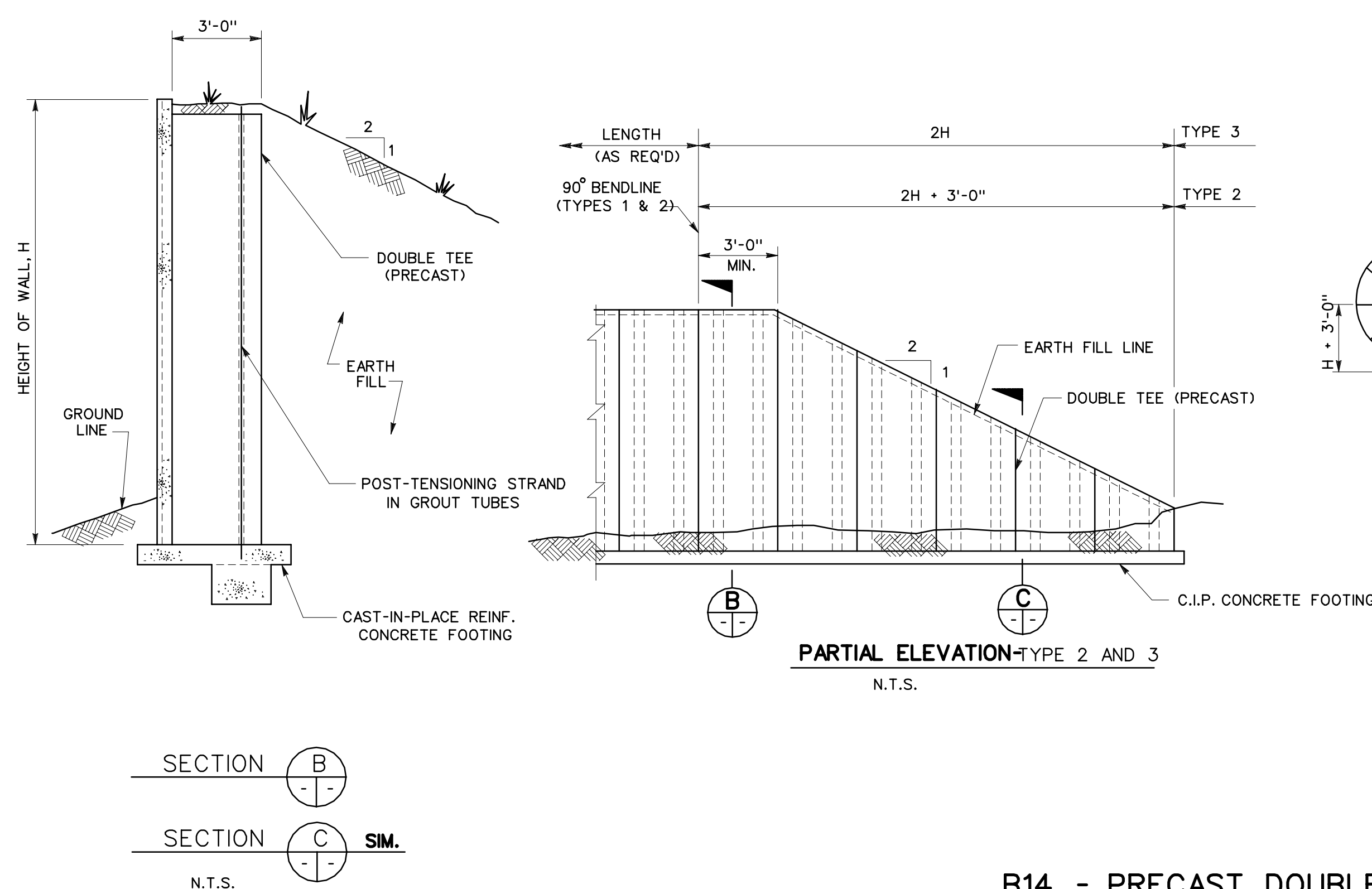
ESTIMATED COST, \$			
PER LIN. FT. OF CROSS SECTION 15 FT. HIGH	LUMP SUM END		
	TYPE 1	TYPE 2	TYPE 3
430	4,300	6,600	7,700

ESTIMATED ERECTION TIME MANHOURS			
100 LIN. FT. OF CROSS SECTION 15 FT. HIGH	END TYPE	END TYPE	END TYPE
	940	90	140

## REMARKS:

1. REQUIRES NO COSTLY FORMWORK.
2. VARIETY OF ARCHITECTURAL FINISHES POSSIBLE.
3. WITHOUT PRESTRESSING, THICK STEMS AND MORE THAN NORMAL REINFORCEMENTS REQUIRED.
4. CRANE EQUIPMENT REQUIRED FOR HANDLING AND ERECTION.
5. SHIMS FOR LEVELING AND NON-SHRINK, NON-METALLIC GROUT REQUIRED PRIOR TO POST-TENSIONING.
6. FOOTINGS REQUIRE ANCHORS FOR POST-TENSIONING.
7. AN INNOVATIVE RETAINING SYSTEM USED BY COLORADO DIVISION OF HIGHWAYS.



B14 - PRECAST DOUBLE TEES


<b>A</b>	<b>SHEET TOTAL CHANGED</b>	22NOV87
Symbol	Description	Date Approved
	Revisions	

Site adapt A/E :  <p style="text-align: center; font-size: small;">U.S. Army Corps of Engineers</p>	<b>U.S. ARMY ENGINEER DIVISION, HUNTSVILLE CORPS OF ENGINEERS HUNTSVILLE, ALABAMA</b>
---	---

Dwn. by :	RDP	Ckd. by :	NE	<h2 style="margin: 0;">BARRICADES</h2>
Reviewed by :		Date :	2 DEC 88	Sheet reference number :
Approved by :		Drawing code :	DEF 149-30-01	<div style="font-size: 2em; font-weight: bold; display: inline-block; margin-right: 10px;">8</div> Sheet 8 of 8

CORPS OF ENGINEERS

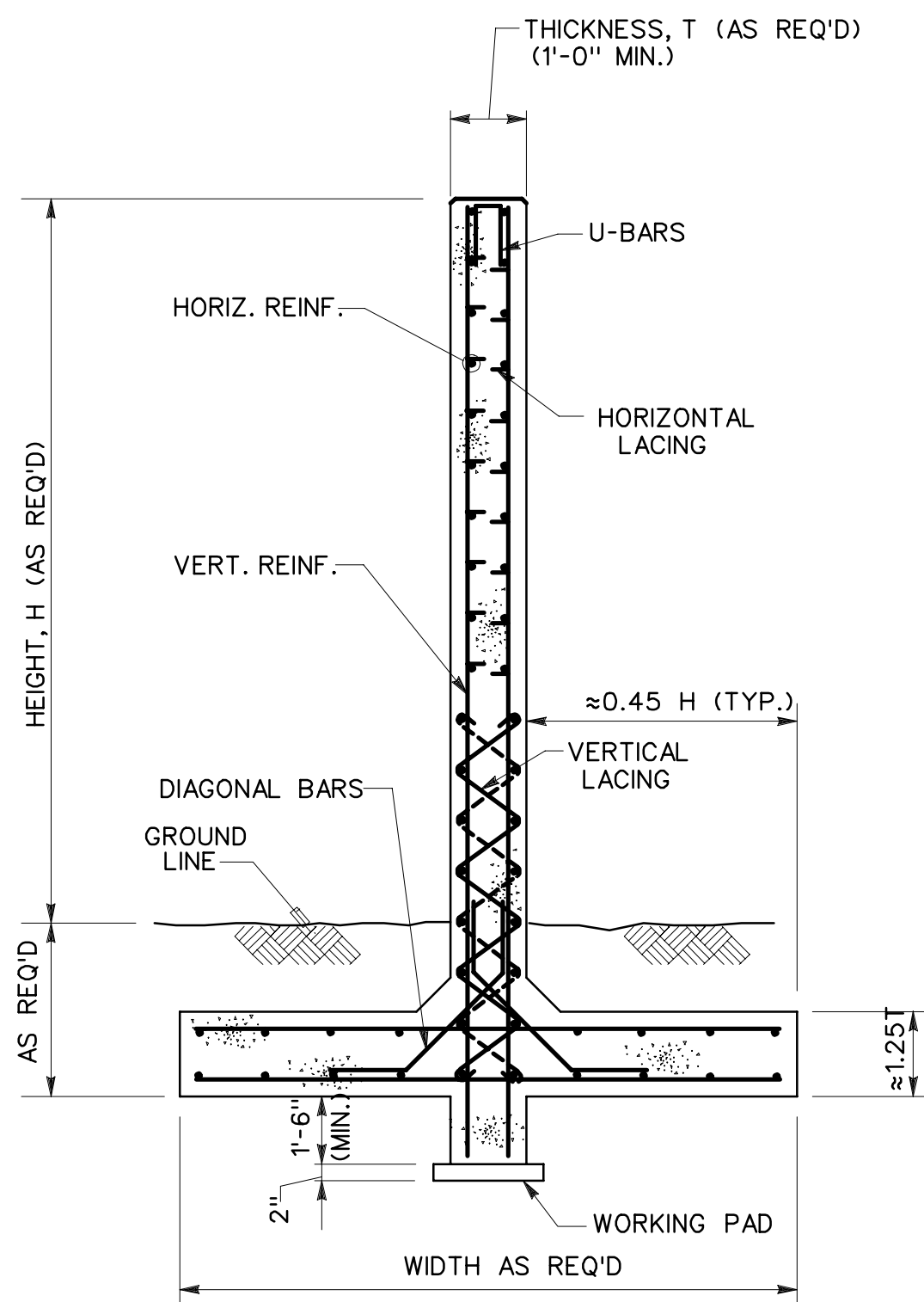
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3

2

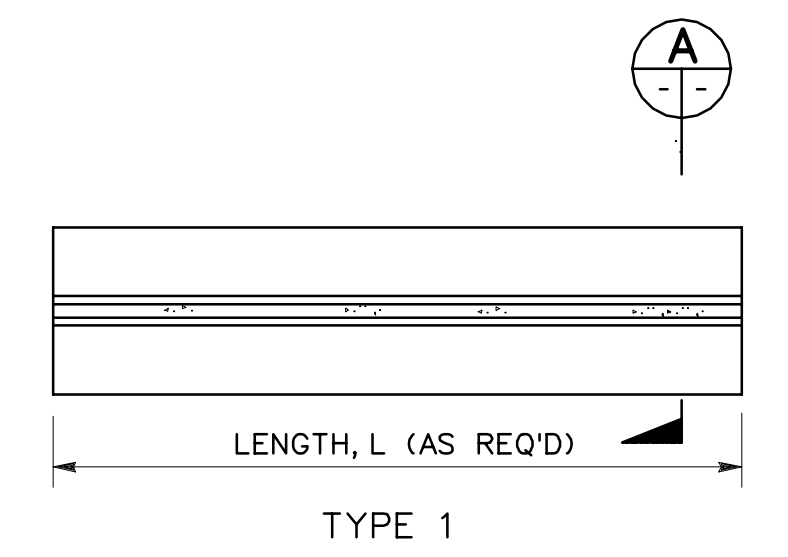
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U.S. ARMY



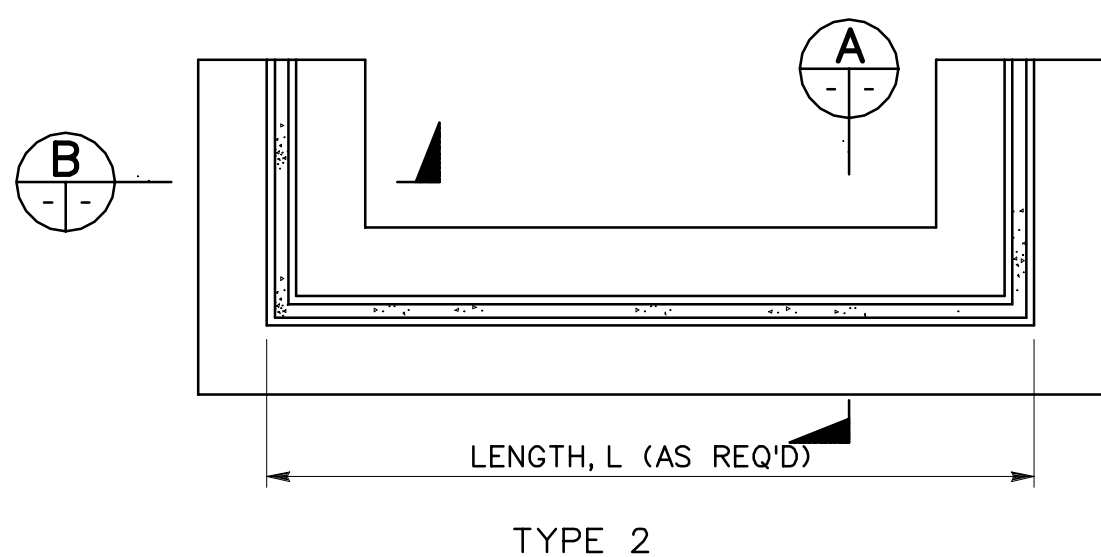
SECTION A-A

SECTION B-B SIM.  
N.T.S.



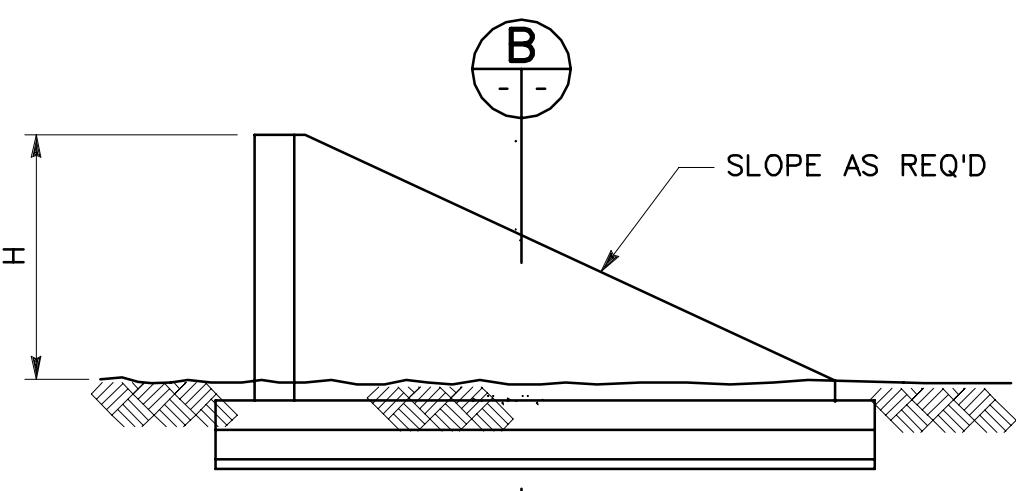
TYPE 1

FRONT ELEVATION



TYPE 2

PLAN  
N.T.S.



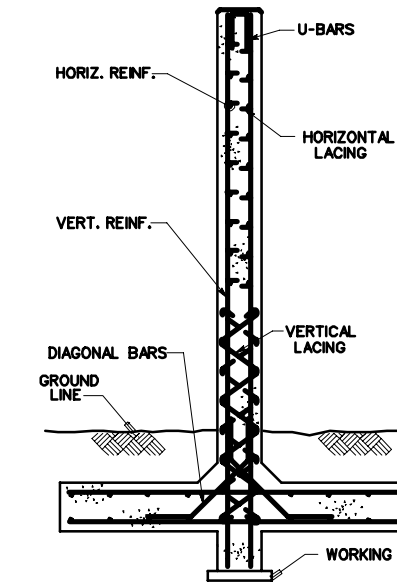
END ELEVATION

B15 - CONCRETE BLAST WALL

ESTIMATED COST, \$		
PER LIN. FT. OF CROSS SECTION 15 FT. HIGH	LUMP SUM END	
	TYPE 1	TYPE 2
290	-	8,800

ESTIMATED ERECTION TIME MANHOURS		
100 LIN. FT. OF CROSS SECTION 15 FT. HIGH	END TYPE 1	
	END TYPE 1	END TYPE 2
1,090	-	290

- REMARKS:
1. WALL MUST BE DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF TM 5-1300 (SEE REFERENCES, SHEET 1).
  2. USUALLY USED TO RESIST THE EXPLOSIVE OUTPUT OF CLOSE-IN-DETONATIONS (HIGH INTENSITY PRESSURE WITH SHORT DURATIONS)
  3. REQUIRES SPECIAL FABRICATION AND CONSTRUCTION PROCEDURES.
  4. DESCRIPTIONS OF OTHER BLAST WALL CONFIGURATIONS CAN BE FOUND IN TM 5-1300.
  5. FOR PROPERLY DESIGNED WALL, EARTH FILL BEHIND WALL IS NOT REQUIRED.



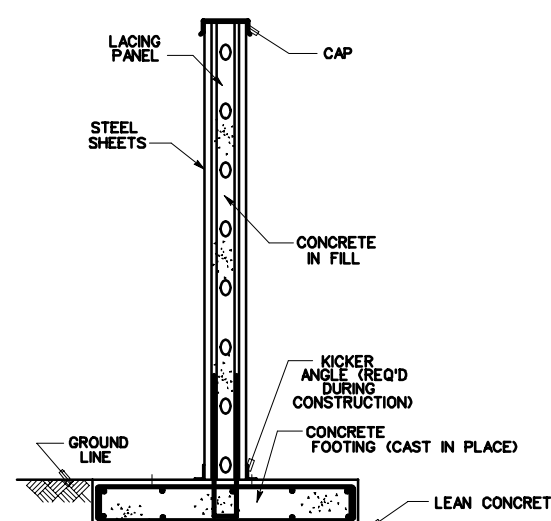
B15 - CONCRETE BLAST WALL

- REMARKS:
1. WALL MUST BE DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF TM 5-1300 (SEE REFERENCES, SHEET 1).
  2. USUALLY USED TO RESIST THE EXPLOSIVE OUTPUT OF CLOSE-IN-DETONATIONS (HIGH INTENSITY PRESSURE WITH SHORT DURATIONS)
  3. REQUIRES SPECIAL FABRICATION AND CONSTRUCTION PROCEDURES.
  4. DESCRIPTIONS OF OTHER BLAST WALL CONFIGURATIONS CAN BE FOUND IN TM 5-1300.
  5. FOR PROPERLY DESIGNED WALL, EARTH FILL BEHIND WALL IS NOT REQUIRED.

ESTIMATED COST, \$		
PER LIN. FT. OF CROSS SECTION 15 FT. HIGH	LUMP SUM END	
	TYPE 1	TYPE 2
210	-	11,400

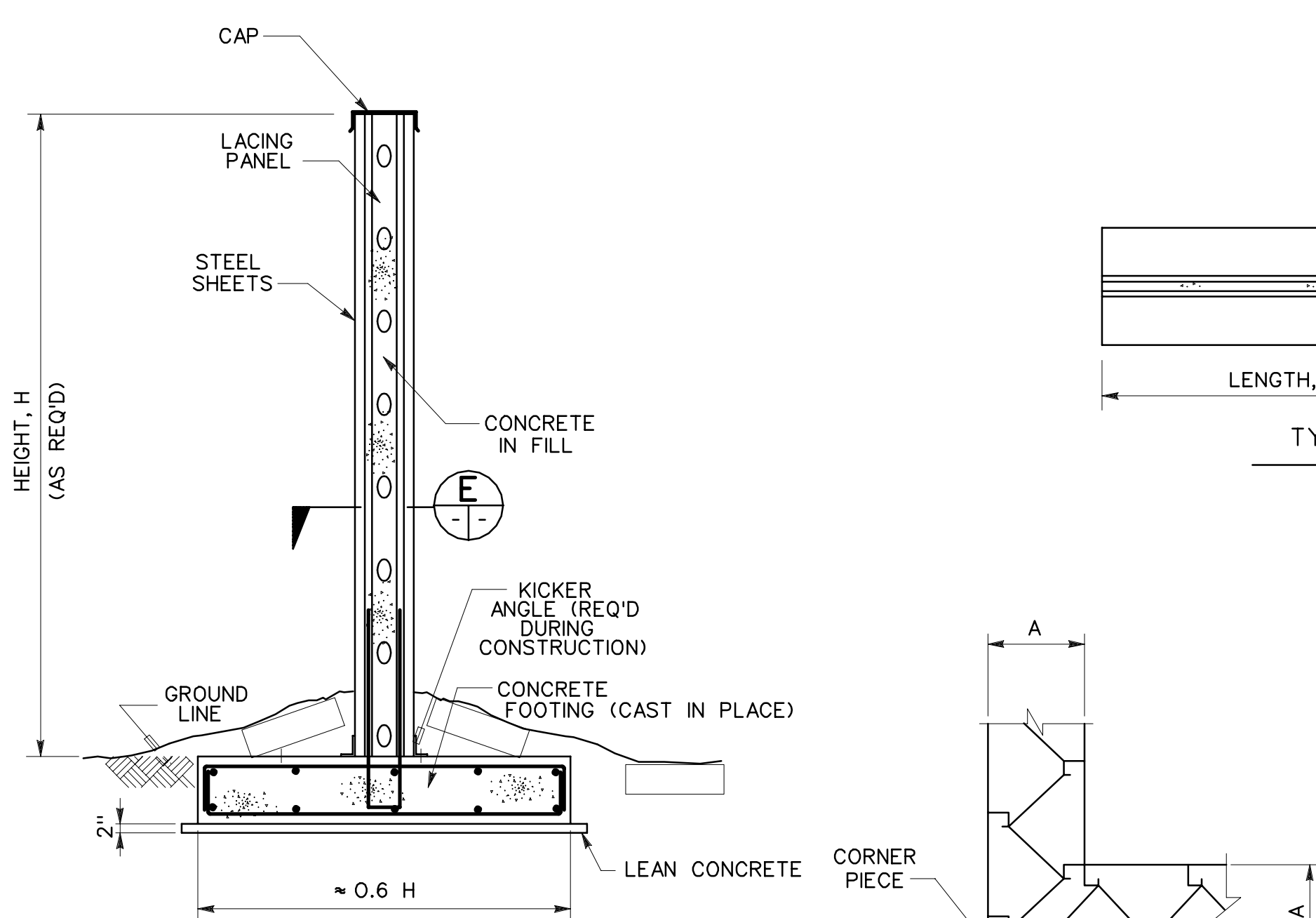
ESTIMATED ERECTION TIME MANHOURS		
100 LIN. FT. OF CROSS SECTION 15 FT. HIGH	END TYPE 1	
	END TYPE 1	END TYPE 2
480	-	250

- REMARKS:
1. AESTHETICALLY PLEASING.
  2. CAN BE ECONOMICALLY AND RAPIDLY CONSTRUCTED WITH UNSKILLED LABOR.
  3. AVAILABLE IN DIFFERENT THICKNESSES.
  4. PROVIDES HIGH RESISTANCE TO FRAGMENT PENETRATION.
  5. FOR PROPERLY DESIGNED WALL, EARTH FILL BEHIND WALL IS NOT REQUIRED.
  6. PATENTED:  
TAFI, INC.  
301 MAPLE AVENUE WEST, SUITE 100  
VIENNA, VA 22180  
(703) 938-9651



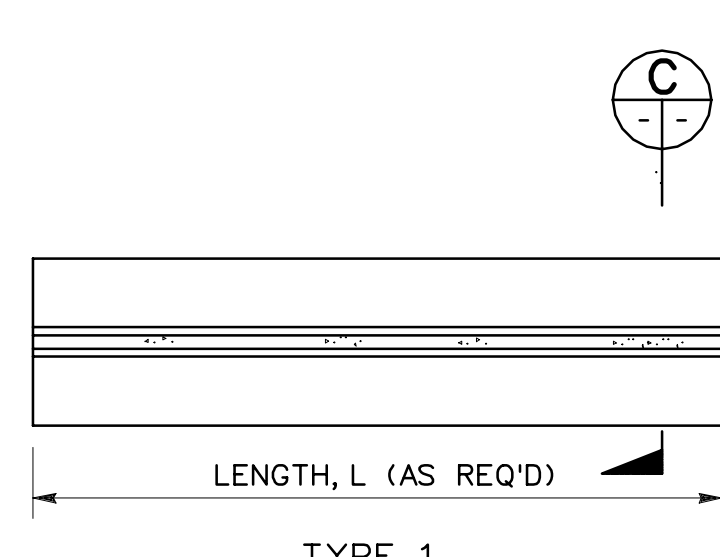
B16 - COMPOSITE WALL SYSTEM

- REMARKS:
1. AESTHETICALLY PLEASING.
  2. CAN BE ECONOMICALLY AND RAPIDLY CONSTRUCTED WITH UNSKILLED LABOR.
  3. AVAILABLE IN DIFFERENT THICKNESSES.
  4. PROVIDES HIGH RESISTANCE TO FRAGMENT PENETRATION.
  5. FOR PROPERLY DESIGNED WALL, EARTH FILL BEHIND WALL IS NOT REQUIRED.
  6. PATENTED:  
INNOVATIVE MILITARY TECHNOLOGY  
60 EAST 42ND ST, SUITE 2580  
NEW YORK, N.Y. 10165  
(212) 599-2030

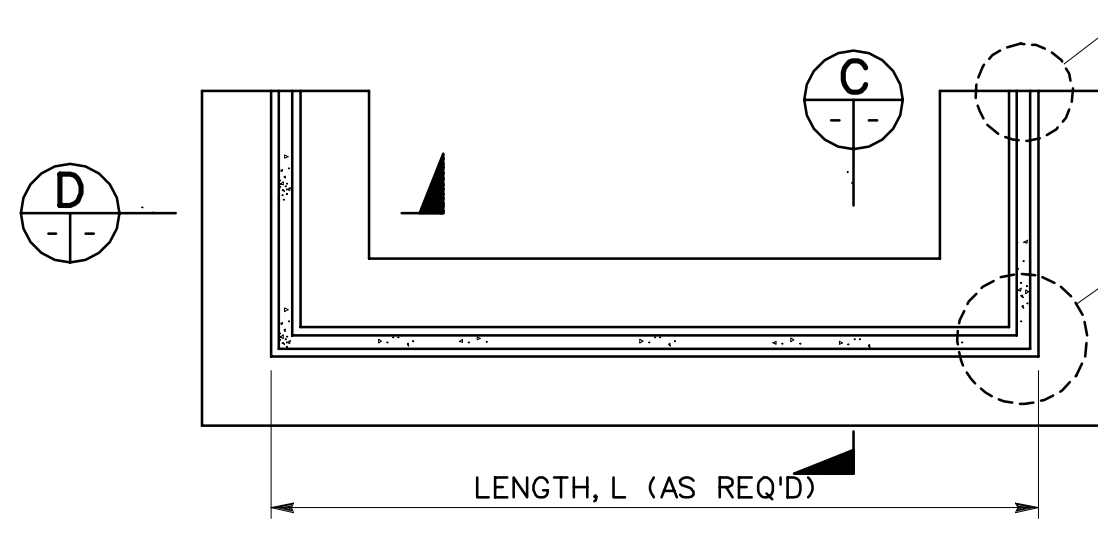


SECTION C-C

SECTION D-D SIM.  
N.T.S.

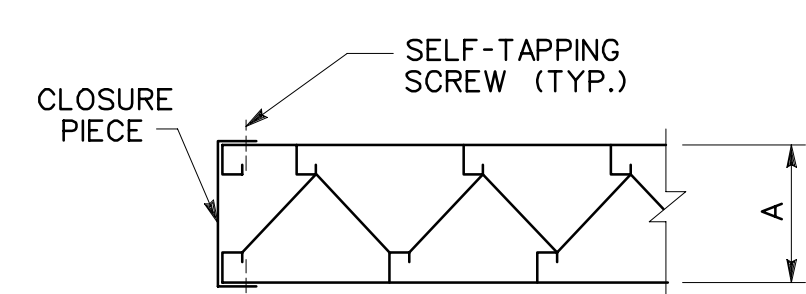


TYPE 1

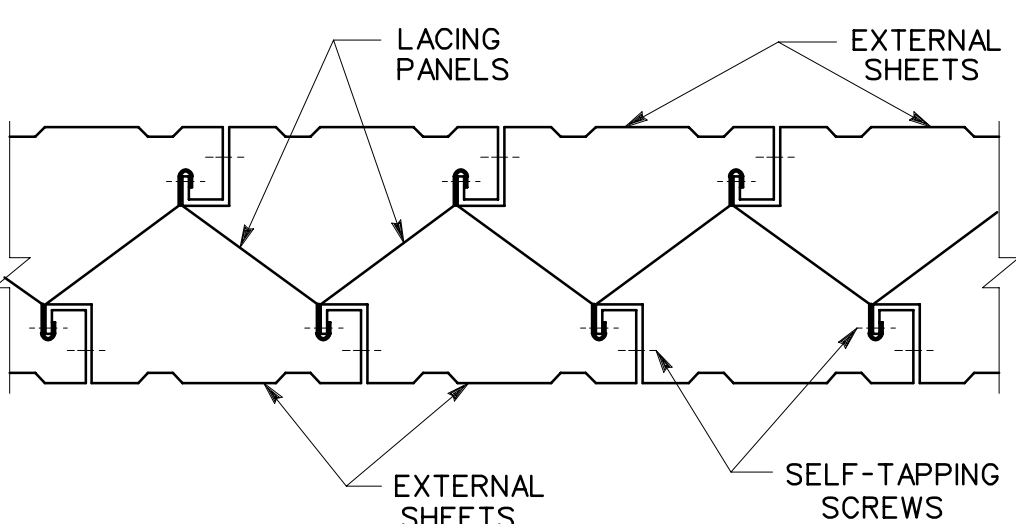


TYPE 2

PLAN  
N.T.S.



DETAIL 2  
N.T.S.



SECTION E-E  
N.T.S.

B16 - COMPOSITE WALL SYSTEM

Symbol	Description	Date Approved
B16	ADDRESS CORRECTED/SHEET TOTAL CHANGED	22NOV88

Revisions			
Site adapt A/E :	U.S. Army Corps of Engineers	U.S. ARMY ENGINEER DIVISION, HUNTSVILLE CORPS OF ENGINEERS HUNTSVILLE, ALABAMA	
Dwn. by : RDP	Ckd. by : AF	BARRICADES	
Reviewed by :	Date : 2 DEC 88	Sheet reference number : 9	Design file no. : 51730
Approved by :	Drawing code : DEF 149-30-01	Sheet	9 of 13

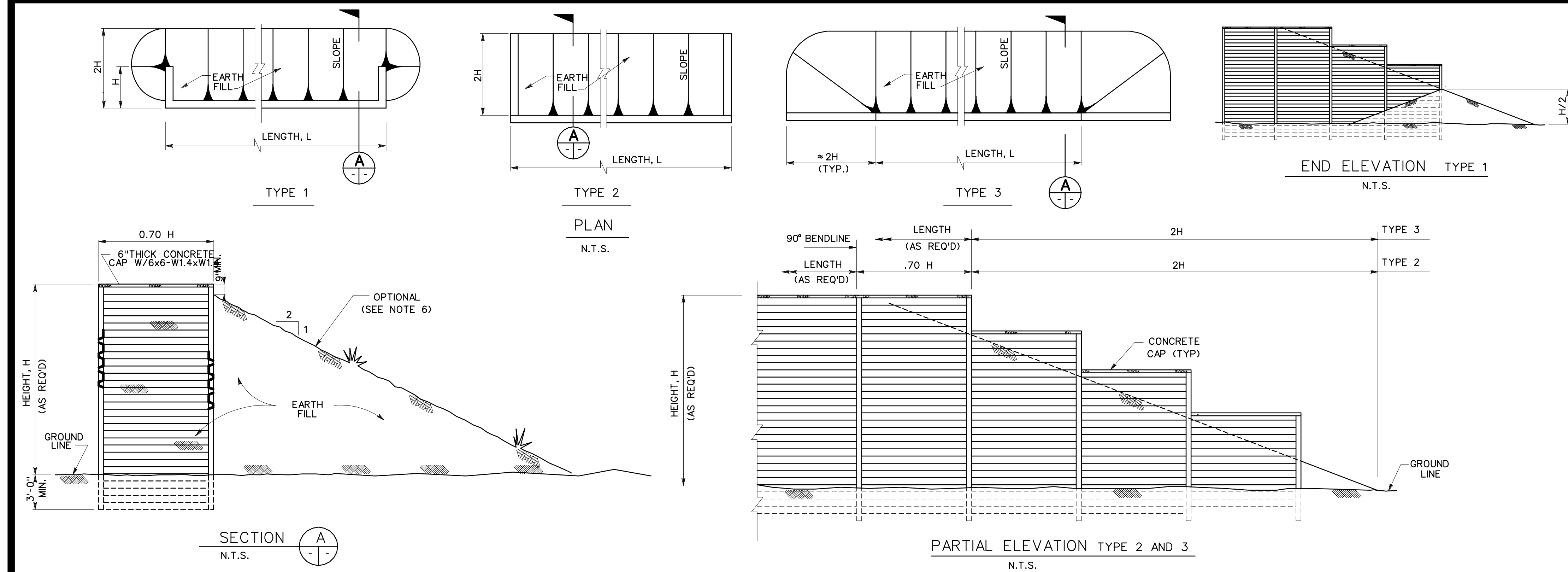
CORPS OF ENGINEERS

4

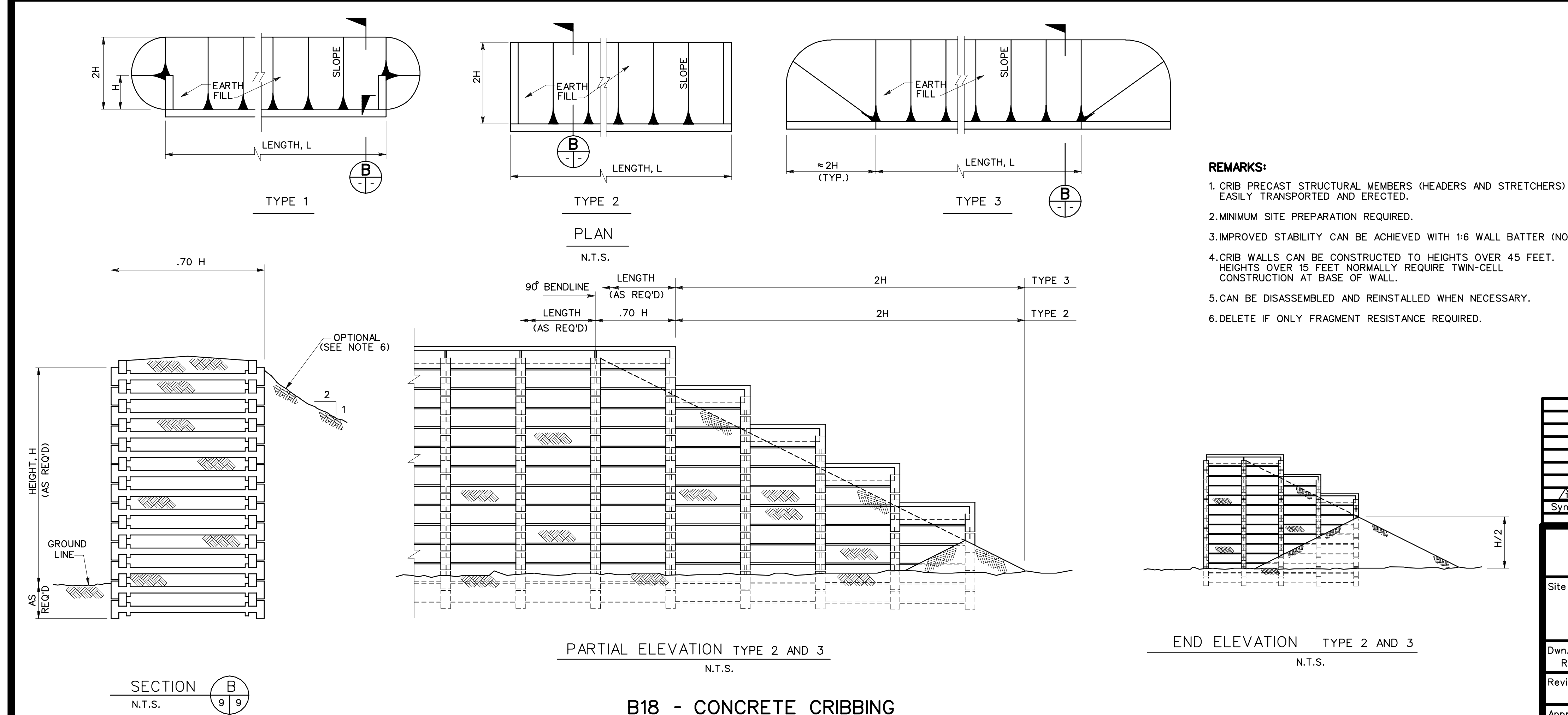
3

2

1 U.S. ARMY



B17 - STEEL BIN



B18 - CONCRETE CRIBBING

## REMARKS:

- CRIB PRECAST STRUCTURAL MEMBERS (HEADERS AND STRETCHERS) EASILY TRANSPORTED AND ERECTED.
- MINIMUM SITE PREPARATION REQUIRED.
- IMPROVED STABILITY CAN BE ACHIEVED WITH 1:6 WALL BATTER (NOT SHOWN).
- CRIB WALLS CAN BE CONSTRUCTED TO HEIGHTS OVER 45 FEET. HEIGHTS OVER 15 FEET NORMALLY REQUIRE TWIN-CELL CONSTRUCTION AT BASE OF WALL.
- CAN BE DISASSEMBLED AND REINSTALLED WHEN NECESSARY.
- DELETE IF ONLY FRAGMENT RESISTANCE REQUIRED.

ESTIMATED COST, \$				
PER LIN. FT. OF CROSS SECTION 15 FT. HIGH	PER SQ. FT. OF WALL FACE 15 FT. HIGH	LUMP SUM		
		TYPE 1	TYPE 2	TYPE 3
810	54	9,000	16,000	16,700
ESTIMATED ERECTION TIME MANHOURS				
100 LIN. FT. OF CROSS SECTION 15 FT. HIGH	END TYPE	END TYPE	END TYPE	END TYPE
1,730	200	370	400	

## REMARKS:

- STEEL BINS ARE PRE-ENGINEERED STRUCTURES EASILY TRANSPORTED TO REMOTE AREAS.
- MINIMUM SITE PREPARATION REQUIRED.
- EASILY ASSEMBLED WITH LIGHT WEIGHT EQUIPMENT.
- AVAILABLE IN WALL HEIGHTS TO 40 FEET.
- CAN BE DISASSEMBLED AND REINSTALLED WHEN NECESSARY.
- DELETE IF ONLY FRAGMENT RESISTANCE REQUIRED.

## 7.SUPPLIERS:

- ARMCO CONSTRUCTION PRODUCTS  
DEPT. LCP-2584  
BOX 800  
MIDDLETON, OHIO 45042
- REPUBLIC STEEL, TERRA-WALL  
4416 LOUISVILLE RD. N.E.  
CANTON, OHIO 44705  
(216)438-5984

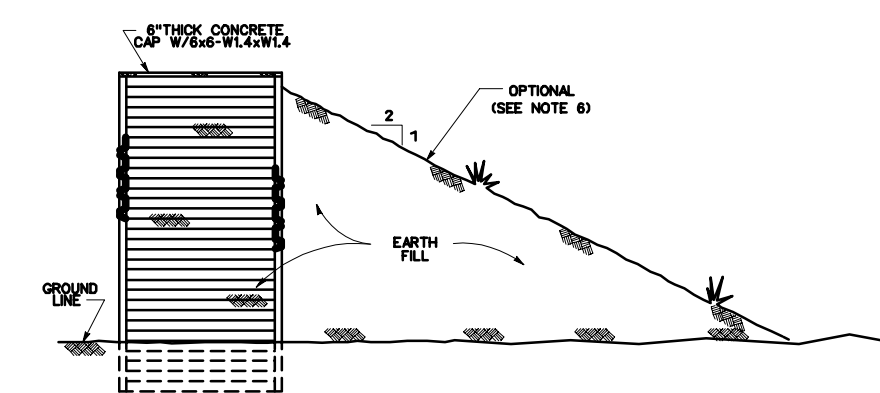
ESTIMATED COST, \$				
PER LIN. FT. OF CROSS SECTION 15 FT. HIGH	PER SQ. FT. OF WALL FACE 15 FT. HIGH	LUMP SUM		
		TYPE 1	TYPE 2	TYPE 3
620	42	4,200	1,000	2,600
ESTIMATED ERECTION TIME MANHOURS				
100 LIN. FT. OF CROSS SECTION 15 FT. HIGH	END TYPE	END TYPE	END TYPE	END TYPE
1,120	110	170	140	

## 7.SUPPLIERS:

- CRIBLOCK RETAINING WALLS OF AMERICA, INC.  
6760 JIMMY CARTER BLVD.  
SUITE 140  
NORCROSS, GA 30071  
(404) 242-1918
- EVERGREEN SYSTEMS, INC.  
KINGS PARK, N.Y.  
(213) 762-7967
- CONCRIB - HILFRIK RETAINING WALLS  
3900 BROADWAY  
EUREKA, CA 95501
- DEPENDABLE CONCRETE PRODUCTS CO.  
P.O. BOX 296  
GARY, ILL 60015  
(312) 639-2303

SHEET TOTAL CHANGED		22NOV88	Approved
Symbol	Description	Date	Revisions
U.S. ARMY ENGINEER DIVISION, HUNTSVILLE CORPS OF ENGINEERS HUNTSVILLE, ALABAMA			
Site adapt A/E :	BARRICADES		
Dwn. by : RDP	Ckd. by : AF	Date : 2 DEC 88	Sheet reference number : 10
Reviewed by :	Drawing code : DEF-149-30-01	Design file no. : 51731	Rev Sheet 10 of 13

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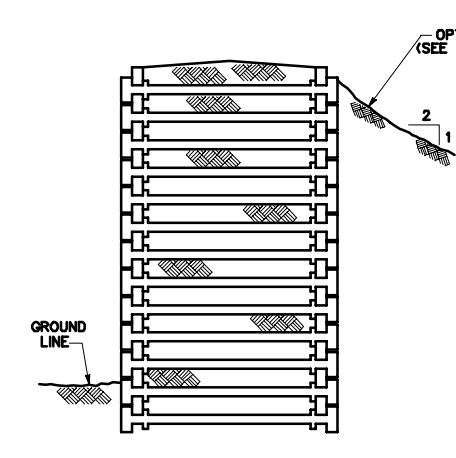
B17 - STEEL BIN

## REMARKS:

- STEEL BINS ARE PRE-ENGINEERED STRUCTURES EASILY TRANSPORTED TO REMOTE AREAS.
- MINIMUM SITE PREPARATION REQUIRED.
- EASILY ASSEMBLED WITH LIGHT WEIGHT EQUIPMENT.
- AVAILABLE IN WALL HEIGHTS TO 40 FEET.
- CAN BE DISASSEMBLED AND REINSTALLED WHEN NECESSARY.
- DELETE IF ONLY FRAGMENT RESISTANCE REQUIRED.

## 7.SUPPLIERS:

- ARMCO CONSTRUCTION PRODUCTS  
DEPT. LCP-2584  
BOX 800  
MIDDLETON, OHIO 45042
- REPUBLIC STEEL, TERRA-WALL  
4416 LOUISVILLE RD. N.E.  
CANTON, OHIO 44705  
(216)438-5984



B18 - CONCRETE CRIBBING

## REMARKS:

- CRIB PRECAST STRUCTURAL MEMBERS (HEADERS AND STRETCHERS) EASILY TRANSPORTED AND ERECTED.
- MINIMUM SITE PREPARATION REQUIRED.
- IMPROVED STABILITY CAN BE ACHIEVED WITH 1:6 WALL BATTER (NOT SHOWN).
- CRIB WALLS CAN BE CONSTRUCTED TO HEIGHTS OVER 45 FEET. HEIGHTS OVER 15 FEET NORMALLY REQUIRE TWIN-CELL CONSTRUCTION AT BASE OF WALL.
- CAN BE DISASSEMBLED AND REINSTALLED WHEN NECESSARY.
- DELETE IF ONLY FRAGMENT RESISTANCE REQUIRED.

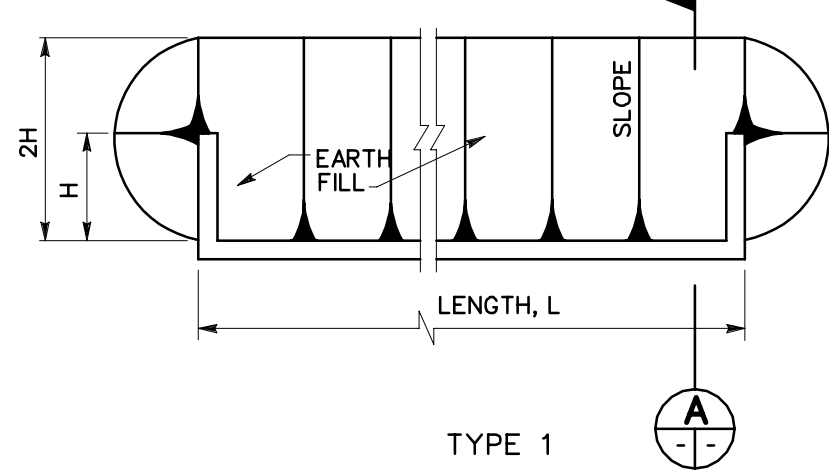
## 7.SUPPLIERS:

- CRIBLOCK RETAINING WALLS OF AMERICA, INC.  
6760 JIMMY CARTER BLVD.  
SUITE 140  
NORCROSS, GA 30071  
(404) 242-1918
- EVERGREEN SYSTEMS, INC.  
KINGS PARK, N.Y.  
(213) 762-7967
- CONCRIB - HILFRIK RETAINING WALLS  
3900 BROADWAY  
EUREKA, CA 95501
- DEPENDABLE CONCRETE PRODUCTS CO.  
P.O. BOX 296  
GARY, ILL 60015  
(312) 639-2303

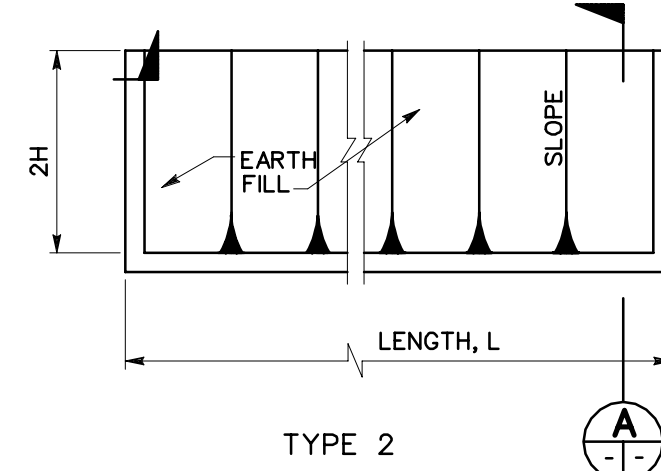


CORPS OF ENGINEERS

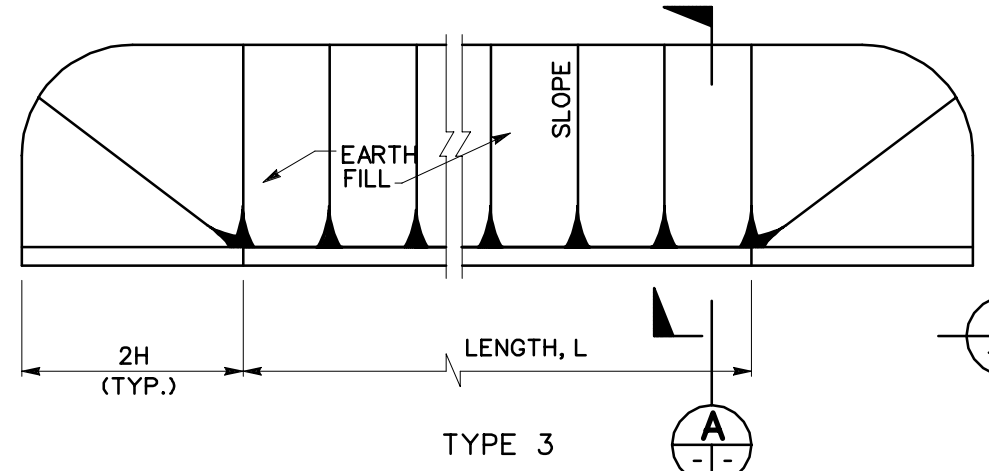
U.S. ARMY



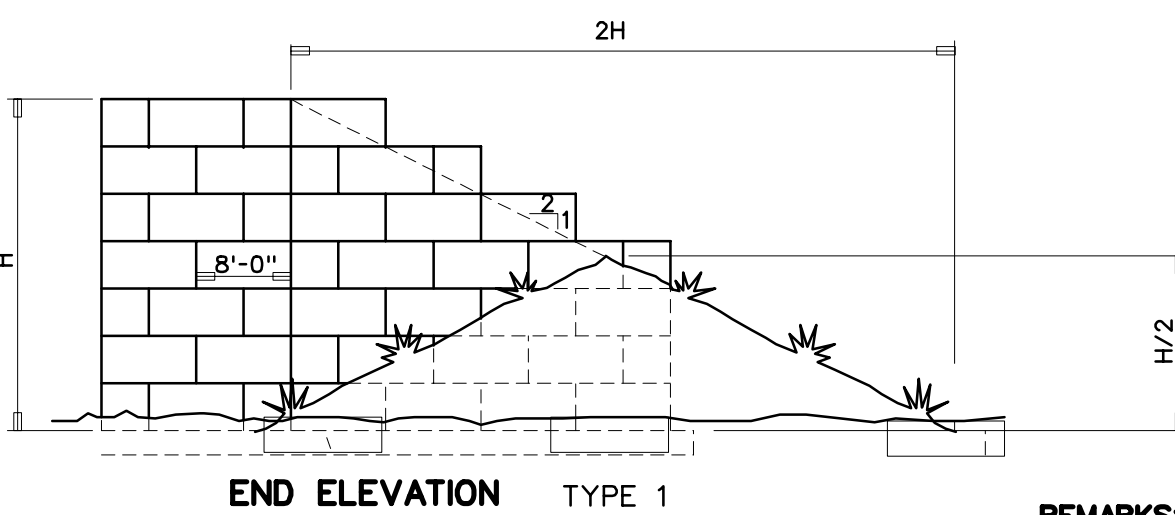
TYPE 1



TYPE 2

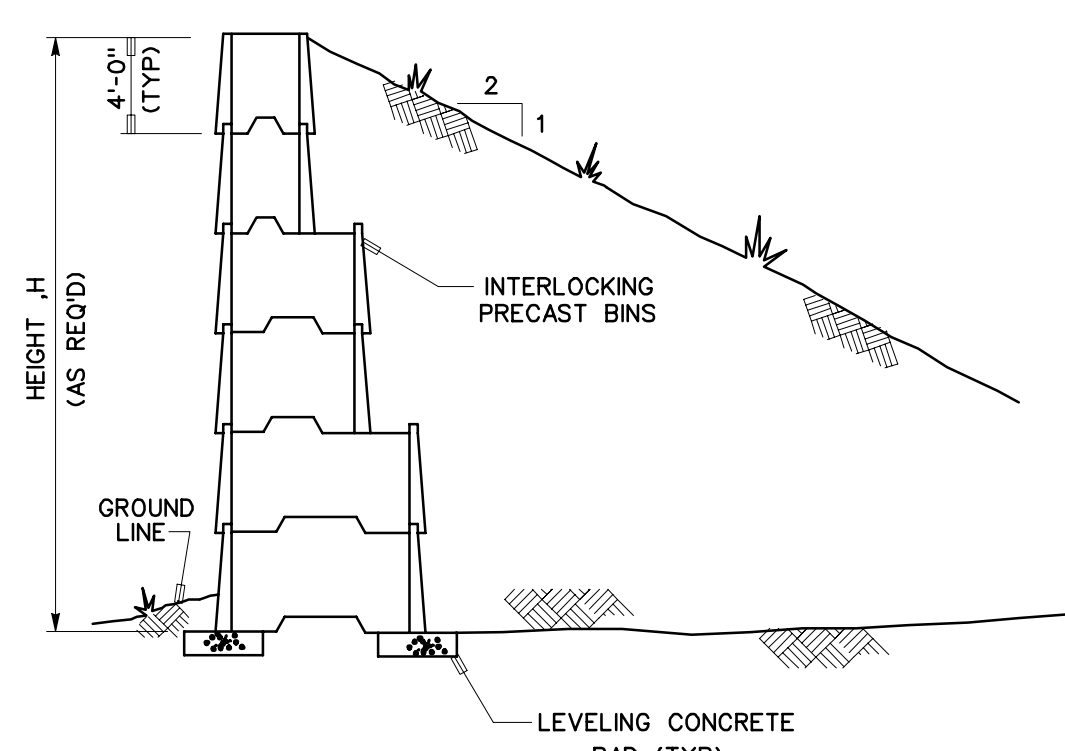


TYPE 3

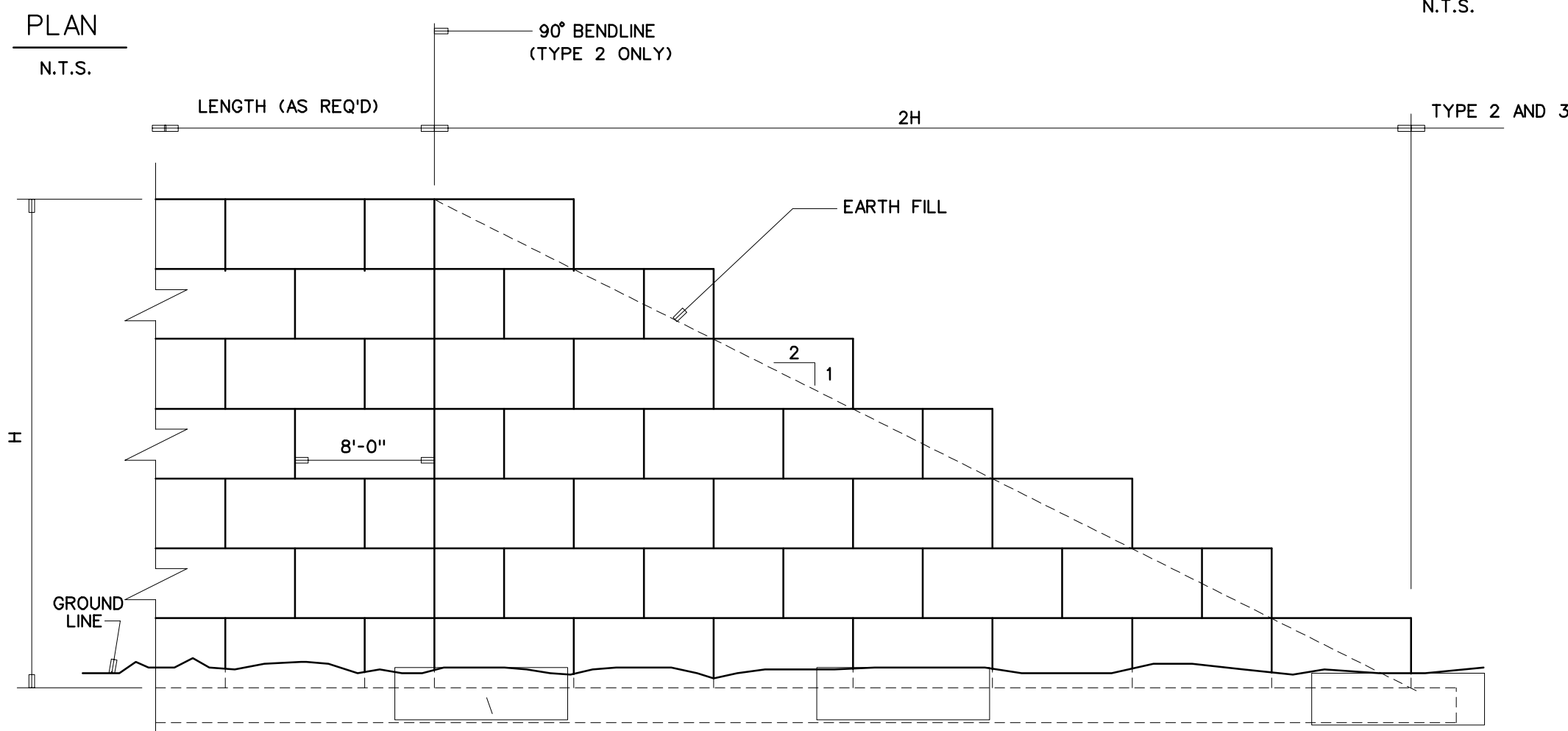


END ELEVATION TYPE 1

550	37	9,900	13,400	13,850
1,600	285	390	390	



SECTION A BACK FACE STEPPED (DOUBLEWALL SHOWN)

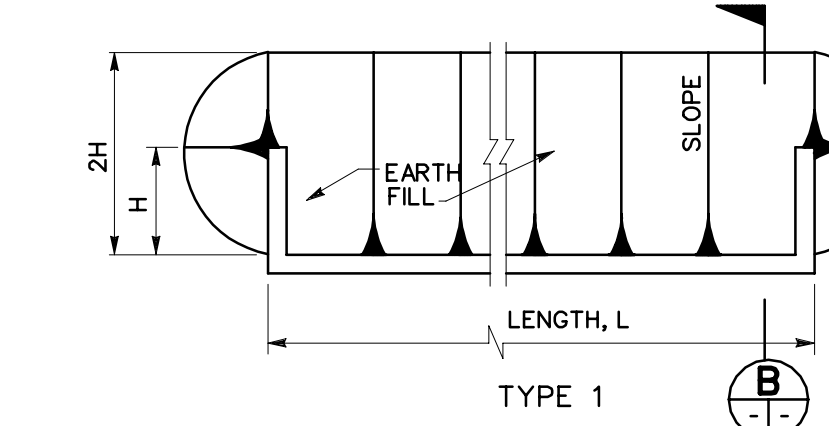


PARTIAL ELEVATION TYPE 2 AND 3

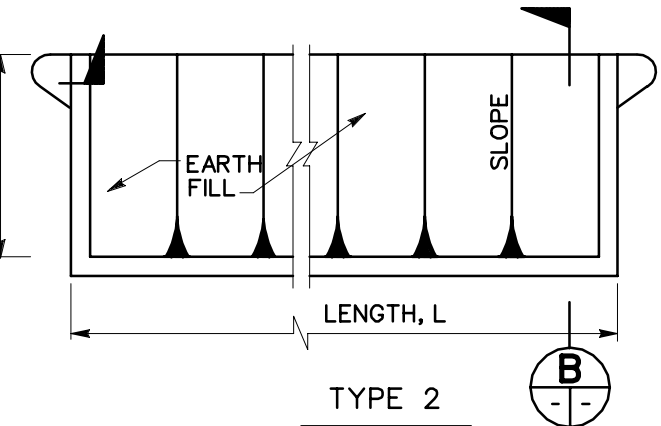
- REMARKS:
1. CAN BE ECONOMICALLY AND RAPIDLY CONSTRUCTED.
  2. ERECTION UNAFFECTED BY CLIMATIC CONDITIONS.
  3. ON-SITE LABOR AND FORM COSTS ARE SMALL.
  4. AESTHETICALLY PLEASING, SELECTED SURFACE FINISHES POSSIBLE.
  5. CAN TOLERATE DIFFERENTIAL SETTLEMENT.
  6. CAN BE DISMANTLED AND RELOCATED.
  7. TRADEMARK:
    1. DOUBLEWALL CORPORATION  
58 EAST MAIN STREET  
PLAINVILLE, CT 06062  
TEL: (203)793-0205
    2. MODUWALL PRECAST CONCRETE  
ADDRESS NOT AVAILABLE

480	32	4,500	5,300	6,200
1,130	140	100	180	

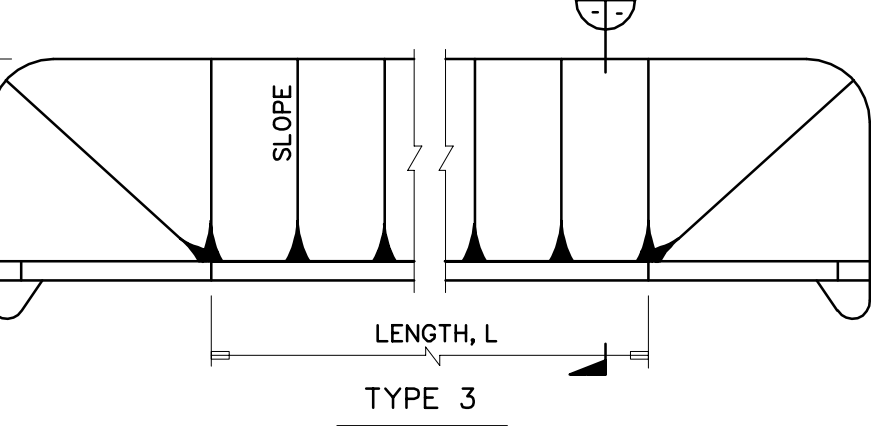
- REMARKS:
1. CAN BE RAPIDLY ERECTED BY A SMALL CREW.
  2. HEIGHT LIMITATION 27'-0"
  3. STORAGE AND ERECTION SIMPLIFIED DUE TO RIB SYMMETRY.
  4. PRECAST ELEMENTS ARE MANUFACTURED BY LOCAL PRECASTERS.
  5. WALL MAY BE BATTERED.
  6. PATENTED:
    1. THE NEEL COMPANY  
6520 DEEPFORD STREET  
SPRINGFIELD, VA 22150  
TEL: (703)922-6778
  7. PRECASTER:
    1. TINDALL CONCRETE PRODUCTS  
P.O. BOX 1778  
SPARTANBURG, S.C. 29304  
TEL: (803)576-3230



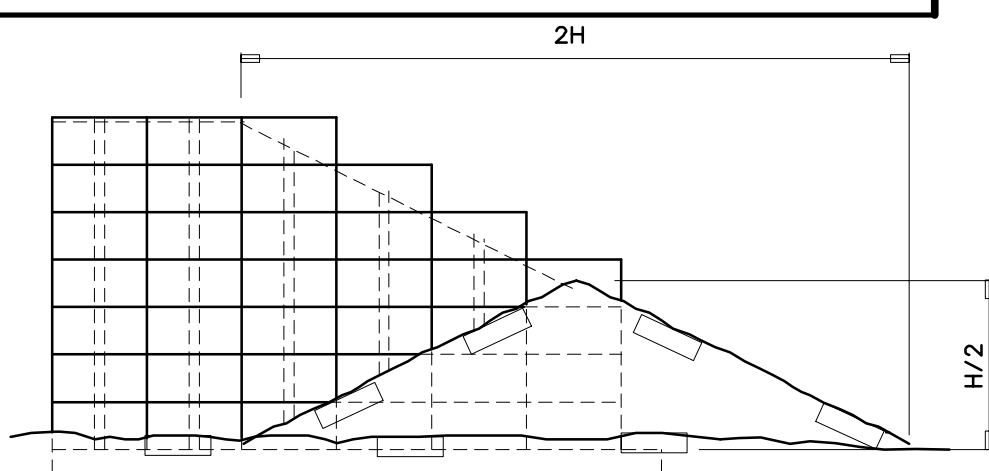
TYPE 1



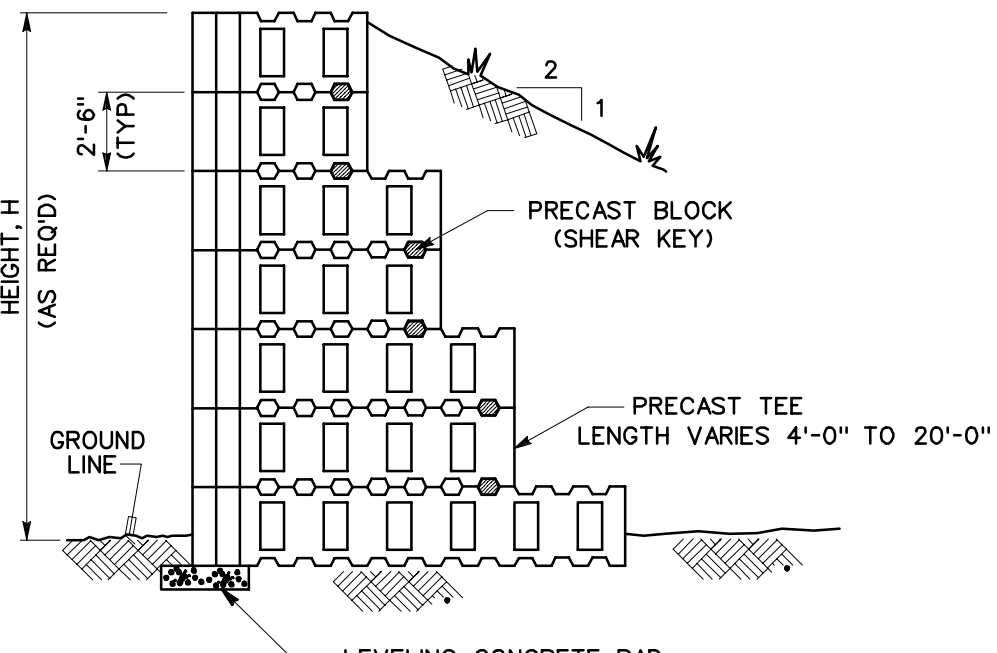
TYPE 2



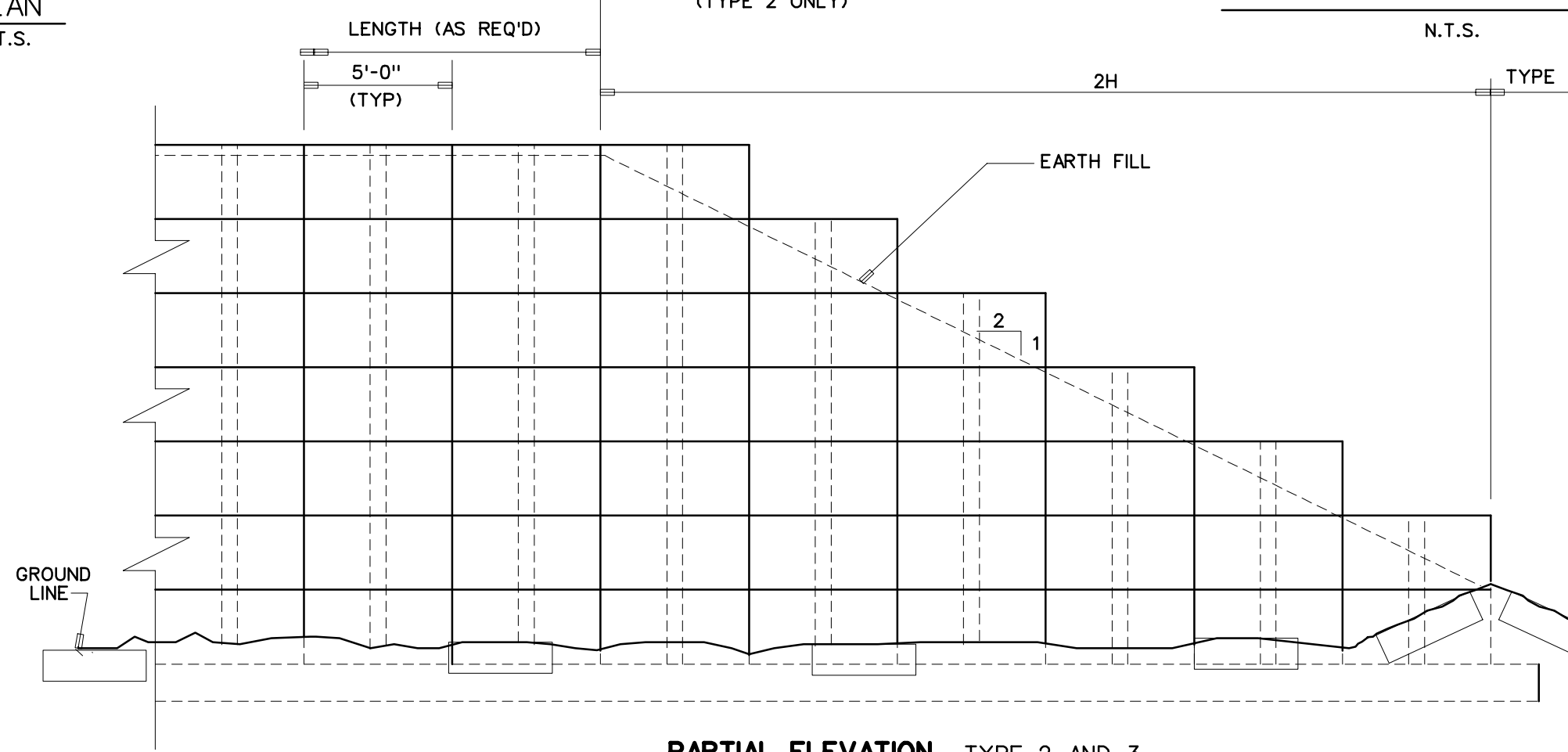
TYPE 3



END ELEVATION TYPE 1



SECTION B

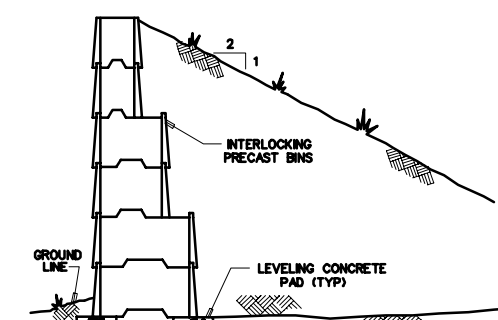


PARTIAL ELEVATION TYPE 2 AND 3

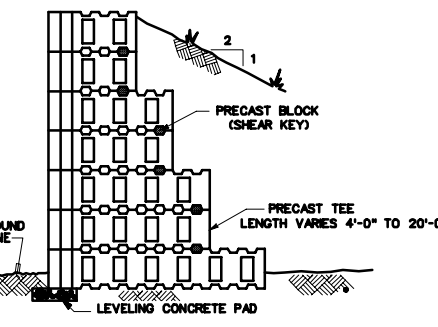
B20 - PRECAST T-WALL

SHEET TOTAL CHANGED		SHOWS	
Symbol	Description	Date	Approved
U.S. ARMY ENGINEER DIVISION HUNTSVILLE CORPS OF ENGINEERS HUNTSVILLE, ALABAMA			
Site adapt A/E :			
Dwn. by : ROP	Ckd. by : AF	BARRICADES	
Reviewed by :	Date : 2 DEC 88	Sheet reference number : 51732	Design file no. : 51732
Approved by :	Drawing code : DEF 149-30-01	11	Rev Sheet 11 of 13

barr11.dgn



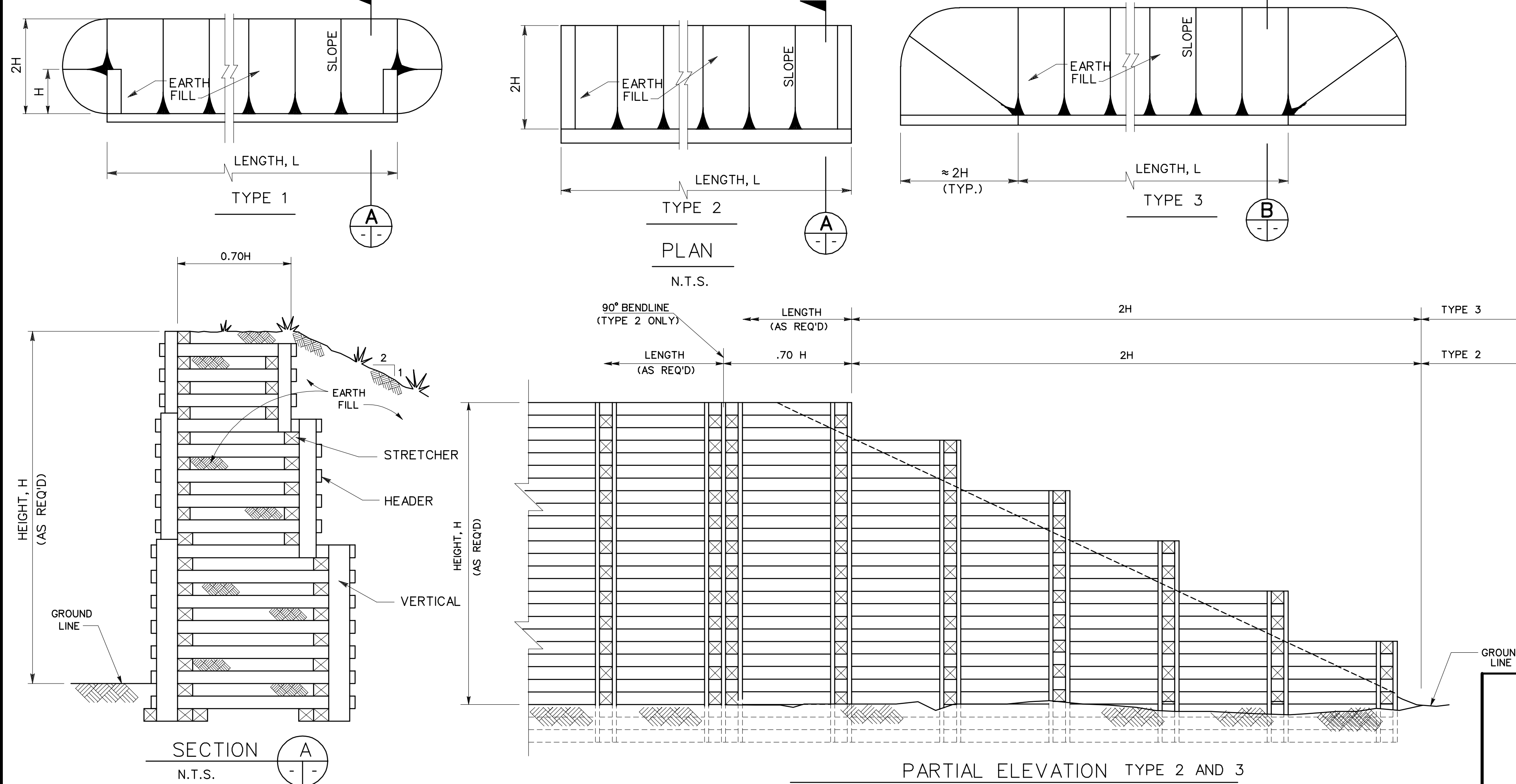
- REMARKS:
1. CAN BE ECONOMICALLY AND RAPIDLY CONSTRUCTED.
  2. ERECTION UNAFFECTED BY CLIMATIC CONDITIONS.
  3. ON-SITE LABOR AND FORM COSTS ARE SMALL.
  4. AESTHETICALLY PLEASING, SELECTED SURFACE FINISHES POSSIBLE.
  5. CAN TOLERATE DIFFERENTIAL SETTLEMENT.
  6. CAN BE DISMANTLED AND RELOCATED.
  7. TRADEMARK:
    1. DOUBLEWALL CORPORATION  
58 EAST MAIN STREET  
PLAINVILLE, CT 06062  
TEL: (203)793-0205
    2. MODUWALL PRECAST CONCRETE  
ADDRESS NOT AVAILABLE
    3. TINDALL CONCRETE PRODUCTS  
P.O. BOX 1778  
SPARTANBURG, S.C. 29304  
TEL: (803)576-3230



- REMARKS:
1. CAN BE RAPIDLY ERECTED BY A SMALL CREW.
  2. HEIGHT LIMITATION 27'-0"
  3. STORAGE AND ERECTION SIMPLIFIED DUE TO RIB SYMMETRY.
  4. PRECAST ELEMENTS ARE MANUFACTURED BY LOCAL PRECASTERS.
  5. WALL MAY BE BATTERED.
  6. PATENTED:
    1. THE NEEL COMPANY  
6520 DEEPFORD STREET  
SPRINGFIELD, VA 22150  
TEL: (703)922-6778
  7. PRECASTER:
    1. TINDALL CONCRETE PRODUCTS  
P.O. BOX 1778  
SPARTANBURG, S.C. 29304  
TEL: (803)576-3230

CORPS OF ENGINEERS

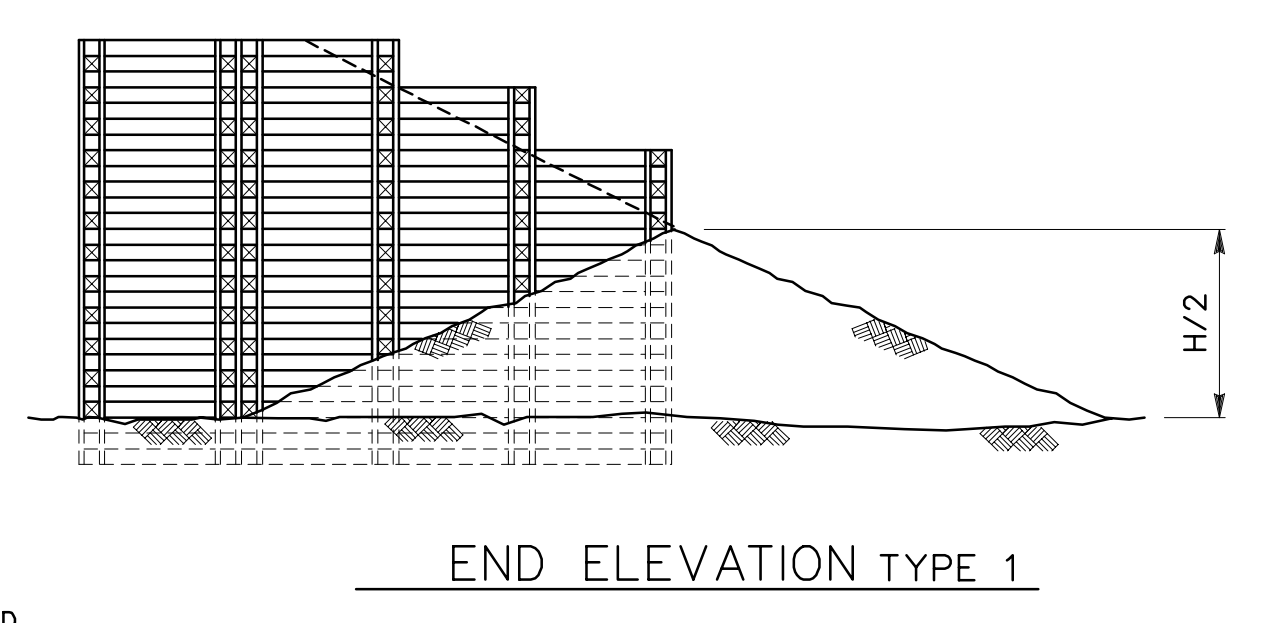
U.S. ARMY



B21 - TIMBER CRIB

ESTIMATED COST, \$			
PER LIN. FT. OF CROSS SECTION 15 FT. HIGH	LUMP SUM END		
	TYPE 1	TYPE 2	TYPE 3
1,440	17,600	36,500	37,300
ESTIMATED ERECTION TIME MANHOURS			
100 LIN. FT. OF CROSS SECTION 15 FT. HIGH	END TYPE 1	END TYPE 2	END TYPE 3
4,120	520	1,040	1,110

- REMARKS:
1. ALL TIMBER SHALL BE PRESSURE TREATED.
  2. ALL STRETCHERS SHALL BE LAID HORIZONTALLY.
  3. FILL, IN AND BEHIND CRIB, SHALL BE FREE DRAINING.
  4. HEIGHT LIMITATION APPROXIMATELY 30 FEET.

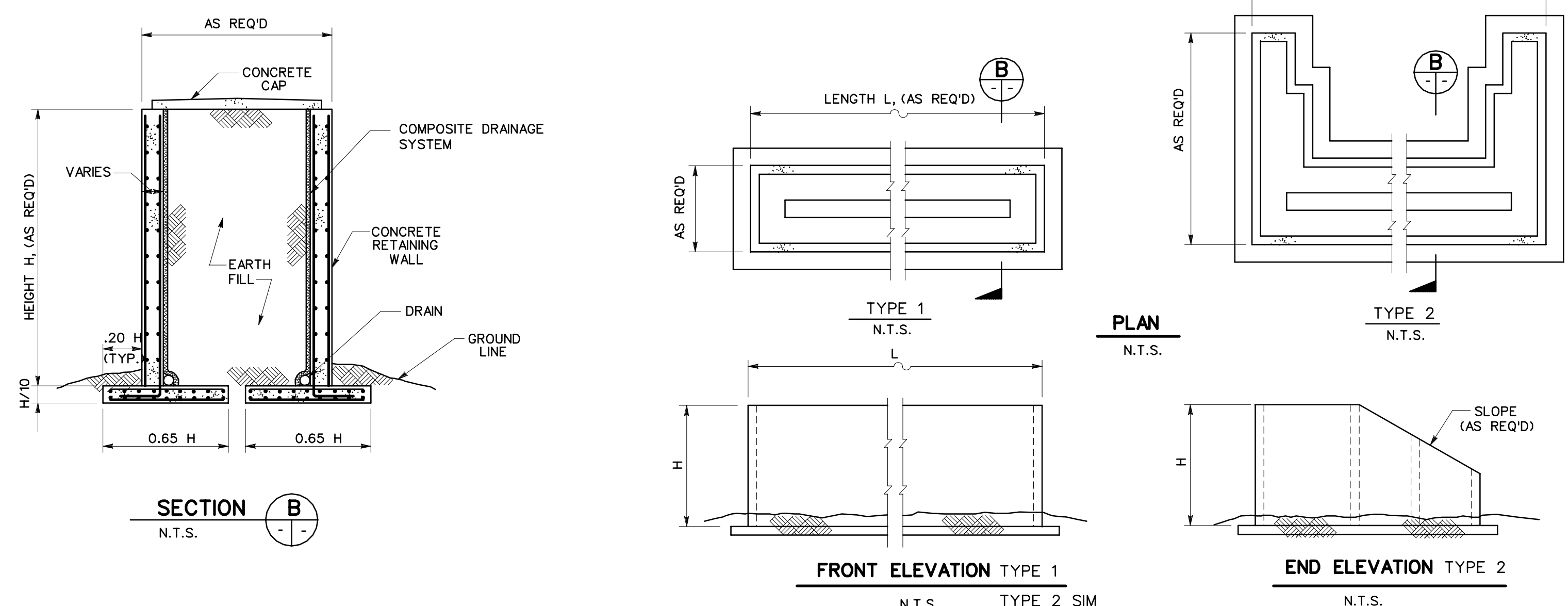


END ELEVATION TYPE 1

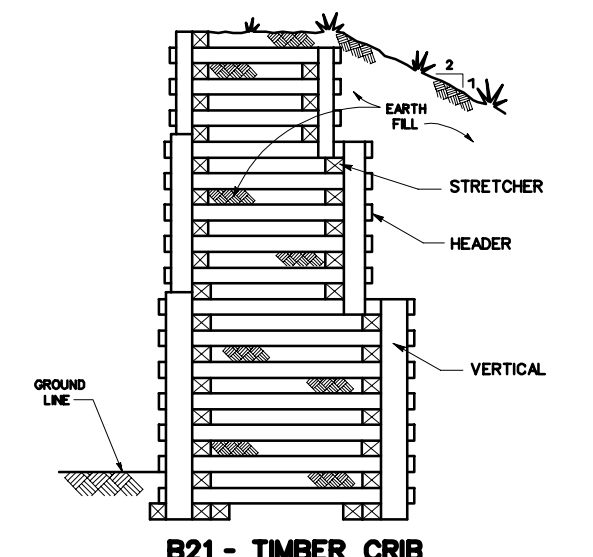
ESTIMATED COST, \$		
PER LIN. FT. OF CROSS SECTION 15 FT. HIGH	LUMP SUM END	
	TYPE 1	TYPE 2
560	3,200	29,500
ESTIMATED ERECTION TIME MANHOURS		
100 LIN. FT. OF CROSS SECTION 15 FT. HIGH	END TYPE 1	END TYPE 2
1,660	90	860

- REMARKS:
1. REQUIRES EXTENSIVE FORMING.
  2. GREATER HEIGHTS WILL CAUSE HIGH SOIL BEARING PRESSURE.
  3. CANNOT TOLERATE SETTLEMENT.
  4. CAN BE LOCATED NEAR BOUNDARIES OR OBSTRUCTIONS.
  5. SEE "B13-CANTILEVER RETAINING WALL" FOR ADDITIONAL INFORMATION.

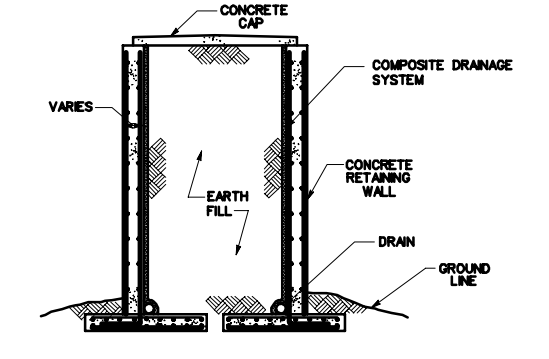
SHEET TOTAL CHANGED		22 NOV 98
Symbol	Description	Date Approved
BARRICADES		
US ARMY ENGINEER DIVISION HUNTSVILLE CORPS OF ENGINEERS HUNTSVILLE, ALABAMA		
Site adapt A/E :		
Dwn. by : RDP	Okd. by : AF	
Reviewed by :	Date : 2 DEC 88	Sheet reference number : 61733
Approved by :	Drawing code : DEF 149-30-01	Design file no. : 604
12		Sheet 12 of 13



B22 - EARTH FILLED CONCRETE WALL



- B21 - TIMBER CRIB
- REMARKS:
1. ALL TIMBER SHALL BE PRESSURE TREATED.
  2. ALL STRETCHERS SHALL BE LAID HORIZONTALLY.
  3. FILL, IN AND BEHIND CRIB, SHALL BE FREE DRAINING.
  4. HEIGHT LIMITATION APPROXIMATELY 30 FEET.



- B22 - EARTH FILLED CONCRETE WALL
- REMARKS:
1. REQUIRES EXTENSIVE FORMING.
  2. GREATER HEIGHTS WILL CAUSE HIGH SOIL BEARING PRESSURE.
  3. CANNOT TOLERATE SETTLEMENT.
  4. CAN BE LOCATED NEAR BOUNDARIES OR OBSTRUCTIONS.
  5. SEE "B13-CANTILEVER RETAINING WALL" FOR ADDITIONAL INFORMATION.

